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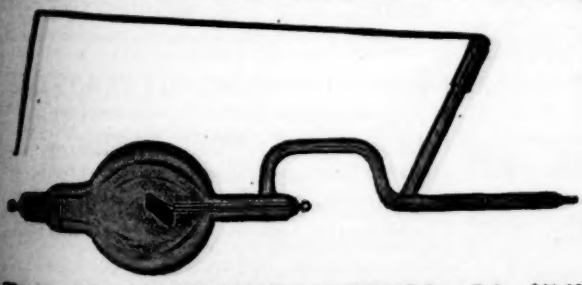

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FRIDAY, NOVEMBER 5, 1897.

CONTENTS:

The Geological Congress at St. Petersburg: JOHN J. STEVENSON.....673
A New Investigation of Man's Antiquity at Trenton, I: HENRY C. MERCER; *II:* ARTHUR HOLLICK..675
Diversity of Languages: RICHARD T. COLBURN...682
Geology and Geography at the American Association for the Advancement of Science: C. H. SMYTH, JR..688
Geological Society of America: C. H. SMYTH, JR..691
Regeneration in Oligochaete Worms.....692
The Survey of the Forest Reserves: W. F. MORSELL..694
Current Notes on Anthropology:—
Maya Day Symbols; The Viking Club: D. G. BRINTON.....695
Botanical Notes:—
A Model Natural History Survey Bulletin; The Useful Fiber Plants of the World: CHARLES E. BESSEY.....696
Scientific Notes and News:—
Report of the Secretary of Agriculture; Geological Survey of West Virginia; The New York Zoological Park; The International Leprosy Conference; General.....697
University and Educational News.....702
Discussion and Correspondence:—
Organic Selection: THOMAS DWIGHT. *A Gasoline Launch for Field Work:* G. D. HARRIS.....703
Scientific Literature:—
Born on Verwachsungsversuche mit Amphibien Larven: CHARLES S. MINOT. *Natural History of the Concise Knowledge Library; Citizen Bird:* C. H. M. *Cooke's Birds of Colorado:* W. H. OSGOOD.....704
Societies and Academies:—
The Biological Society of Washington: F. A. LUCAS. *University of Wisconsin Science Club:* WM. S. MARSHALL.....707
Scientific Journals.....708
New Books.....708

MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE GEOLOGICAL CONGRESS AT ST. PETERSBURG.

THE Seventh International Geological Congress convened at St. Petersburg, Russia, on August 29, 1897, in accordance with the Czar's invitation, presented at the Fifth Congress in 1891.

The enrollment far exceeded that of any previous Congress, the preliminary list showing 966 names, of which only 270 were of Russians. The final list has about 1,100, about 120 of them being American.

The arrangements were upon an imperial scale. Free transportation on all Russian railroads was provided not merely for the members, but also for their families. Excursions were given such as no other Congress can expect, unless, indeed, another meeting be held in Russia. A guide book of 660 pages, with many maps, plates and sections, was prepared, giving detailed information respecting the geology of regions to be visited, a most valuable contribution to geological literature, making accessible, to geologists all over the world, facts previously published for the most part only in proceedings of scientific societies and sealed up in the Russian language.

Three excursions preceded the Congress. That to the Ural Mountains, shared in by somewhat more than 200 members, was in charge of Dr. Tschernychew and lasted for four weeks. This, extending beyond railroad and all other ordinary means of trans-

portation, afforded opportunity for the study of localities almost inaccessible to travellers. That the journey was completed with so little discomfort and with so great advantage to those taking it reflects great credit upon Dr. Tschernychew's management. The excursion to Finland, in charge of Dr. Sederholm, was taken by somewhat more than 100. That region is not so far in miles from civilization as is that of the Urals, but the perplexities of one in charge of a large party are hardly less. The success of this excursion was complete, and Dr. Sederholm earned the gratitude of those who accompanied him. The Esthonia excursion, under Dr. F. Schmidt, had only twenty-five members, but, according to the testimony of them all, the two weeks were spent pleasantly and with great profit.

A fourth excursion began on September 5th, at the close of the Congress. This was to a more distant part of the empire, extending to the Caucasus and in one division to Mt. Ararat.

During the week allotted to meetings of the Congress, two days were given to excursions. One to Peterhof, the summer palace of the Czar, was for pleasure only; the other, combining pleasure and instruction, was to the Falls of Imatra—a long excursion in short time. The excursionists left St. Petersburg at 6:30 a.m. and reached the Falls at 1 p.m. They remained there until 7 p.m. and then returned, reached St. Petersburg at 1 a.m., thoroughly fatigued for the most part, but well repaid. The hospitality in the city began to manifest itself on the evening prior to the assembling of the Congress, when the Committee of Organization gave a reception to the members at the Germania club. On August 30th the Grand Duke Constantine gave a reception at his palace to about 200 delegates and the Mayor of the city held a grand function at the Hotel du Ville on September 2d.

The Congress was opened at noon on August 29, 1897, in the large hall of the Zoological Museum of the Academy of Science. Addresses of welcome were delivered by the Grand Duke Constantine, the Princess of Oldenburg and the Minister of Agriculture, to which Professor Capellini replied on behalf of the Congress. The list of officers prepared by the Bureau was read by Professor Renevier and chosen by the Congress, after which an address was made by Professor Karpinsky, the President, who was followed by Dr. Tschernychew, the Secretary-General, who outlined the business which would be presented by the Council. A brief address by the President of the Geographical Society closed the exercises and the Congress adjourned for the day.

The Congress sat twice each day on Monday, Wednesday, Friday and Saturday. The morning sessions were devoted to discussion of principles of nomenclature and to transaction of such matters as were presented by the Council, while those of the afternoon were taken up in the reading of memoirs.

The morning discussions were simplified greatly by the memoirs of Bittner, Loewenson-Lessing and others prepared at request of the committee and printed prior to the Congress. It must be conceded that the results of these discussions do not appear at first glance to be of very great importance; the points agreed upon were such as impose no burdens and they were adopted unanimously. But where the question proved to be serious and material differences of opinion seemed likely to develop, the matter was referred to a committee for consideration and for report to the next Congress. This, however, was the wisest mode of procedure. The Congress has no power to bind its members except in so far as they consent, so that it is not the place in which to thrust one's conceptions too

strongly. Any matter which does not commend itself readily at the first presentation should be laid aside promptly, that no member be allowed to express himself in such manner that his *amour propre* would be wounded in case the vote should go against him. All of the matters referred will be considered carefully by the committee as well as by a great part of the membership during the next three years, and there will be little difference of opinion respecting important matters at the Congress of 1900.

The reading of memoirs was somewhat perfunctory, or rather the listening was so. The feeling seemed to be that these would be printed and that members would have opportunity to digest them at leisure. Several reports were presented by committees, and they will be published in the volume of proceedings. A committee was appointed to consider the principles of chronological classification of sediments and another to consider the propriety of establishing an international journal of petrography. The Congress expressed itself as earnestly favoring the establishment of a permanent floating institute to carry on work such as that of the Challenger expedition, and also as favoring the developing of geological courses for higher classes in lycees and gymnasia. The members were called upon to urge these matters upon their governments.

The Congress adjourned on September 5th, to meet in Paris in 1900.

The real value of this as of previous Congresses is not to be measured by the list of memoirs or by the records of discussions. Important as those may be, they are of vastly less importance than the actual contact of men coming from all parts of the world. Geologists from Asia, the Pacific islands, the Americas and almost all nations of Europe met together; too often known to each other previously only as streaks of printers' ink, they became actual entities; those devoted to similar studies found opportunity to compare observations; many, whose conceptions of phenomena were limited by the little area of their country, have gone home with a broader knowledge; and a long step has been taken toward binding together our men of geology. The true work of the Congress was done not so much in the sessions as in the huge lobby, wisely provided, where those of like minds were gathered in little clusters making liberal dividends of knowledge. This feature was recognized as all important by the Committee of Organization, which, with this in view, planned the excursions on which so much of the real work was done.

To speak of individual members of the Committee of Organization as especially worthy of remembrance may seem ungracious when all were so untiring, but one cannot refrain from acknowledging the indebtedness which all must feel to Karpinsky, Tschernychew, Nikitin, Chrustchoff and Michalski, while the Americans will remember pleasantly the courtesies rendered by Mr. Gardiner, the only American student in the University of St. Petersburg.

JOHN J. STEVENSON.

NEW YORK UNIVERSITY.

A NEW INVESTIGATION OF MAN'S ANTIQUITY AT TRENTON.

I.

A RENEWED search for evidence of glacial man at Trenton induced Professors G. F. Wright and Arthur Hollick, Messrs. H. B Kümmel and G. N. Knapp, of the New Jersey Geological Survey, and myself, on June 25, 26, 27 and 28, 1897, to explore a site on the summit of the glacial gravel terrace at Trenton, where Mr. Ernest Volk*

* Working under the direction of Professor F. W. Putnam for the New York Museum of Natural History, Mr. Ernest Volk was generally present at the

has alleged the discovery of artificial argillite flakes, and other relics of human handiwork, in a yellow sand of supposed glacial age under a surface loam stratum indicating Indian occupancy.

Five trenches (Trench A, 21½ ft. by 3¾ ft. by 3 ft. 3 in. deep; B, 7¾ ft. by 4½ ft. by 3 ft. 3 in. deep; C, 6 ft. by 6 ft. by 2 ft. 8 in. deep; D, 4½ ft. by 4½ ft. by 3 ft. 3 in. deep), sunk over an area 90 ft. long by 33 ft. broad,* well upon the flat summit of the terrace, with Trench D, about 80 ft. from the outer brink, revealed clearly:

Layer 1.

(10 inches to one foot).

A discolored surface loam, disturbed by recent cultivation, mixed with the remains of the Indian and white man. It contained:

	Specimens.
Blocked-out blades, Argillite	3
Blocked-out blades, Chert	2
Argillite blade, long, narrow (spear form)	1
Arrow-head, broken, Jasper	2
Arrow-head, broken, Chert	1
Hammer stone, pebble, fragment	1
Animal bones, with large scapula, probably Elk splintered limb bones and limb bone of a bird	22
Mussel shell (Unio) fragments	6
Pebbles, probably fire-cracked	131
Teshoa or pebble flake, scraper?	1
Argillite flakes, probably artificial, generally with green patina	19
Chert flakes, probably artificial	11
Jasper flakes, probably artificial	5
Stone (unidentified) flakes, probably artificial	6
Quartz and Quartzite fragments	5
Potsherds, Indian (8 found together)	9
Pebbles unworked; size, from that of robin's egg to goose egg; largest 4 in. in diameter	55
Miscellaneous stones, mostly pebble fragments	103
Oyster shell	1
Cinder fragment	1
Anthracite coal fragments	2
Glazed potsherds	2
Brick fragment	1

digging and hospitably offered us every assistance, being seconded by the kindness of the owners of the property, the Misses Lalor, who generously placed their land at our disposal. Dr. Charles C. Abbott was continually present, and Dr. Harrison Allen, of the Academy of Natural Sciences, of Philadelphia, visited the Trenches on Sunday, June 27th.

* Kindly reserved for our use by the Misses Lalor, owners of the property, for whose generous hospitality we herewith return our thanks.

Below layer 1, and as the chief center of observation and interest, rested

Layer 2.

(18 inches to 2 feet).

Composed of a fine yellow sand, streaked towards its lower portion with fine irregular films of reddish sandy clay which thickened and coalesced at the bottom into a distinct harder red band.

Advancing slowly into layer 2 with trowels against the sides of the trenches where the stratification had been exposed in vertical section, we pulled out one by one the pebbles, broken stones and artificial chips, etc., described below, giving special attention to the large pebbles and the chips most artificial in appearance, calling the attention of all our colleagues to each large object, when it first clinked against the trowel's edge so that its depth could be measured and its position with reference to the clay films, observed by us all before its removal.

The objects thus found (after discarding those resting in the upper part of the layer for about four inches below the bottom of layer 1 as pertaining to what we called the zone of doubt) were as follows:

ARTIFICIAL FLAKES.

Note.—The numbers in inches after the specimens indicate the depth in Layer 2 below the zone of doubt, the letters the trench referred to.

	Number of Specimens.
Jasper, 10 in.	1
Jasper, 12 in.	1
Quartz, 4 in	1
Argillite green patina, 6½ in	1
Sandstone or Argillite, 2½ in	1
Argillite lying flat, 3¾ in	1

Argillite, 7 in 1
Jasper, 12 in 1
1¾ in. wide, ½ in. thick, Trench A 2 in. resting on its side below a thin film of reddish clay. The film waved from one side of the trench to the other over the specimen, becoming slightly thinner and fainter directly above it, though without showing signs of break. Photographed in place, 20 in. See Figs. 1 and 3 1
Argillite green patina, about 1 in. in diameter, possibly artificial, resting exactly in line of clay film, 12 in 1
Quartzite, possibly artificial, 8 in . . . 2
Chert (resting indubitably in films of sandy clay. Trench B. Photographed in place,

FIG. 1.—View of face of Trench A, showing Argillite specimen (see middle right-hand specimen in Fig. 3, Professor Hollick's paper) resting in place, 20 inches down, in the yellow sand at base of the rule. The trowel scratch marks the position of the film of stratification just above the specimen. The lower scratches mark the thickening of these films at the base of the yellow sand. From surface to trowel, Layer 1 (Indian), ten inches to one foot. From trowel to series of scratches, Layer 2, yellow sand, relic bearing, eighteen inches to two feet. Below scratches coarse sand and gravel, non-relic bearing. Specimen photographed in place June 26, 1897, by Ernest Volk, in presence of G. F. Wright, H. B. Kümmel, C. C. Abbott and H. C. Mercer.

signed G. F. Wright, Arthur Hollick, H. C. Mercer). See Figs. 2 and 3 (in Dr. Hollick's paper), 12 in. 1
Flakes Argillite, small below clay film, Trench B., 14 in 1
Quartz, Trench B., 8 in 2
Quartzite pebble, 10 in 1
Argillite, possibly artificial C., 12 in . . 1
Quartzite, possibly artificial C., 10 in . . 1
Jasper, possibly artificial C., 6 in . . . 1
Argillite, possibly artificial C., very small piece, 2½ in 1
Chert from pebble, 6 in 1
Argillite, possibly artificial, 3 in. long by 1¾ wide, green patina under a very distinct film of reddish sandy clay, Trench C., 19 in 1
Argillite, possibly artificial, exactly in line of heavy red film and 6 in. below fainter film C., 16 in 1
Quartz, possibly D., 6 in 1
Chert from pebble, 6 in 1
Argillite, probably artificial, bedded in filmings of reddish sandy clay not immediately overlaid by a continuous film, but rather by faint reddish broken streaks D, 15 in 1
Argillite patinated, 2¾ in. long, 1½ in. wide, 1¼ in. thick, probably artificial, resting in series of clay films less clearly marked than in the other trenches, but nevertheless extending over the specimen in a series of blotches, D, 16 in . 1
Argillite piece, possibly artificial, on film, 15 in 1
Argillite piece, possibly artificial, on C, 12 in 1

Total 30

ANTHRACITE COAL.

Small fragment size of hazlenut, below zone of doubt, in yellow sand 1
Anthracite coal, small piece size of hazlenut, C, 3½ in 1

Total 2

ROOTS.

In all the trenches, various sizes from fine rootlets to size of middle finger, various depths.

PEBBLE USED.

Battered on end, 6 in 1

Total 1

PEBBLES, UNUSED.

Depth, 9 in	1
Largest, size of pigeon egg; smallest, size of pea (various depths)	75
2 in. below red film, under which chipped Argillite was found lying flat, 16 in	1
Large pebble resting directly upon clay film, 17 in., 8½ in. long, 4¾ in. wide at widest, 2½ in. thick	1
Flat, 16 in	1
Large in Trench A, 15 in	1
1½ in. in diameter, 4 in. under film	1
18 in	1
Under film, 16 in	1
Unused, large in film, 16 in	1
Small, 16 in	2
Small, 16 in	3
Most of the pebbles saved from 1 in. to 2 in. in diameter.	
Large, about 4 in. in diameter, broken, showing on one side, according to Mr. Kümmel, facets of wind erosion, in film, 14 in.	1
Weathered, 2¾ in. long, 2 in. wide, 1½ in. thick, resting below a distinct film and above another, 17 in.	1
2½ in. long on film, 16 in.	1
3 in. in diameter, Trench D, 6 in. on film	1
1 in. in diameter on film, 18 in	1
On film, 18 in	1
Size of large Chestnut on film, 20 in	1
Smaller below film, 14 in	1
Hazlenut size, 14 in	1
Unused, 3½ in. long, 2½ in. wide, ⅝ in. thick	1
Various depths	27
Various depths, Trench B	64
Various depths, Trench C	26
Lower part of stratum, various depths.	16
2 in. long, 1½ in. wide, near three smaller pebbles	6
2 in. below red film, 16 in.	1
(Large, 7½ in. long, 5½ in. broad, 3 in. at thickest, broken, upper side roughened but not certainly wind-worn, C, 16 in.)	1
D, various depths	13
Total	254

PEBBLES FRACTURED.

2 in.	1
4 in.	1
9 in.	1
Small fragment, Trench B, 9 in.	1
Small piece, probably broken by fire, 5 in.	1
In connection with black streak extending down from surface,	2
Small piece, 2 in.	1
Total	8

MISCELLANEOUS STONES. PROBABLY NOT ARTIFICIAL.

Flat Sandstone fragment, 18 in	1
Jasper (?) fragment, 10 in	1
Quartzite (?) fragment, 18 in	1
Argillite (?), 13 in	1
Unidentified piece, 6 in	1
Flat stone, possibly chip, 12 in	1
Argillite piece, vertical position, 6 in	1
Argillite piece, 7 in	1
Quartz piece, flat, 4 in	1
Argillite piece, flat, 1½ in	1
Sandstone fragment, 4 in	1
Shale piece, 2½ in	1
Quartz fragment, 2½ in	1
Red Shale fragment close under faint red clay film, 18 in	4
Argillite chip, possibly artificial, 12 in	1
Shale fragment, 3 in. diameter, 18 in	1
Argillite fragment, Trench C., 10 in	1
Quartz, depth not marked	1
Quartzite fragment, 6 in	1
Argillite fragment, 6½ in	1
Total	23

ANT GALLERIES.

About size of string-bean pod, not so long, 1 in. below irregular filmings, penetrating film by narrow hole, size of timothy grass, D, 16 in.	1
Size of lima bean, under clay film, just above which is another similar gallery, containing eggs, Trench D, 22 in.	1
½ in. horizontal diameter, ¼ in. vertical, 1½ in. below middle film, followed inward and lost without tracing upward through film, Trench B, 11 in	1
Total	3

CONCLUSION.

Fifty stone flakes mostly man-made, not of argillite alone, as we had been led to expect, but of argillite, chert, jasper and quartz, one battered pebble and two fragments of anthracite coal, thus positively

found in the much discussed stratum of yellow sand which we have called Layer 2, present us with interesting evidence as to the relation of the sand stratum to man; while in the further presence of twenty-three miscellaneous stones, and two hundred and fifty-four water rolled pebbles, ranging in magnitude from the size of a chestnut to that of an ostrich egg, we are confronted with interesting considerations as to the deposition of the sand, whether by wind or water.

The antiquity of man, at the site, judged by these observations, depends on three questions:

1. *Are the significant chips in the yellow sand artificial?* To which my experience answers yes.

2. *Are they in situ in the yellow sand?* To this I would say that the notion of the intrusion of objects from the Indian surface layer above (Layer 1), down and into the sand below (Layer 2), is suggested to me for the following reasons: Because the deepest artificial specimen in the yellow sand (Layer 2), rested not over three feet below the surface; because the range of stone chips (argillite, jasper and quartz) and fractured pebbles was identical in the yellow sand (Layer 2), and the Indian Layer (Layer 1), and showed thickest under the latter, growing thinner downward; because argillite chips identical in character and equally decomposed and patenated occurred in both layers; because two pieces of anthracite coal were found in the upper part of the sand (Layer 2), and, lastly, because the artefacts were scattered at irregular depths in the sand (Layer 2), nowhere suggesting by their collocation a floor of occupancy or workshop abandoned by primitive man.

On the other hand, neither the shallow depths of the objects nor the closeness of the layers exceeded conditions known to archæology where divergent culture epochs had been found to rest closely one upon another. And while no potsherd or bone was found below (in Layer 2), the similarity of the stones used where the blade material (ingredient to glacial gravel) had continually remained the same failed to overweigh the probability of antiquity as to the specimens from the lower layer. Coal fragments not uncommon in the alluvium of the Delaware, whose trough traverses coal beds near Mauch Chunk, had been found by me in an underplaced Indian village layer, probably pre-Columbian, at Upper Black's Eddy,* while the observed position of roots and the study of small ant galleries failed reasonably to account for the site of the chips in Layer 2, whose position in several cases beneath well observed and unbroken films of stratification remained the most important fact in the evidence.

When all was considered I was forced to conclude that a significant number of artificial chips rested in situ in the sand, and hence were of an age antedating its deposition.

Here again, as at the underplaced layer at Lower Black's Eddy, we were confronted by two thin strata of human occupancy, resting one upon the other, but separated from each other by an interval of time as yet unmeasured.

Antedating the familiar Indian, preceding the birth of the known riparian forest as indicated by the superficial blackness of its plant-stained loam, the immediately underplaced yellow sand Layer 2, close beneath the surface as it lay, testified to the previous presence of a chipper of argillite, jasper and chert, and a bruiser of pebbles, upon the surface of the bluff. As before remarked, the bones of animals and pottery, characteristic of the upper layer, were ab-

* See researches upon the antiquity of man in the Delaware Valley and the eastern United States. Publication of the University of Pennsylvania, Vol. VI., p. 78. Ginn & Co., Boston. 1897.

sent in the lower; otherwise, no marked difference appeared in the kind of stones used, their patina, or mode of fracture.

From the evidence previously produced by the more notable explorations of the Trenton site, the present testimony differs in several particulars. The shallow zone of discovery, ceasing at about three feet below the surface, failed to encroach upon the region (10, 20 and 30 feet deep in the immediately underplaced gravel) alleged as the horizon of previously excavated human relics. No series of ovate blades resembling the drift specimens of France and England appeared as in previous years, to out-classify all other objects; while the contention (unreasonably over-valued in our opinion) in favor of the absence of jasper in earlier human horizons was not sustained by our discoveries. Nevertheless the existence of man upon the bluff top under topographical conditions differing from those of the present had to to be admitted.

This granted, however, the question of human antiquity at the site depended not so much upon the evident priority of the sand relics to the Indian remains of the surface loam as upon the length of time of such priority—namely, upon the final space question:

3. *What was the age of the sand?* Extending outside the province of my qualification, this question remained to be settled by my colleagues. Let their special experience decide whether this yellow layer resting exactly upon the Trenton gravels is a true part of their composition. Was this overlying sand the work of the river swollen to excessive volume by the melting of the great glacier? Had modern rivulets, since drained away, spread it upon the terrace top? Or, during the time before trees grew and loam formed, had wind whirled it, pebbles, clay films and all, upon the even table of the bluff?

HENRY C. MERCER.

II

ON June 25th, by invitation of Professor G. Frederick Wright, the following party met at Trenton, N. J., to make excavations in the Trenton gravel terrace, and to examine any archæological material which might be brought to light: G. Frederick Wright, Oberlin, Ohio; H. C. Mercer, Doylestown, Pa.; C. C. Abbot, Trenton, N. J.; Ernest Volk, Trenton, N. J.; Arthur Hollick, Staten Island, N. Y., and a workman to perform the rough digging.

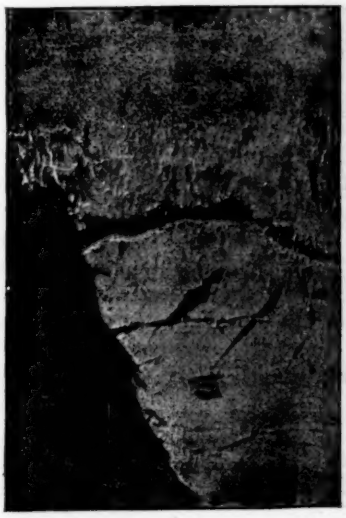

FIG. 2. Artificial chert specimen (see also upper right-hand specimen, Fig. 3, on next page) photographed as found in place in the yellow sand. The trowel scratches show the line of films of stratification above and below the object. The dark, deep scratch marks bottom of Layer 1 (Indian), 10 inches to 1 foot. Yellow sand, Layer 2, extends downward from heavy trowel streaks. Photographed by Mr. Volk in the presence of Professor Wright, Dr. Hollick and Mr. Mercer.

Through the kindness of the Misses Lalor, a part of their farm, favorably located on the edge of the terrace, had been reserved for investigation. Upon the surface of this part an area about forty feet long in a north

and south direction, by about four feet wide, was selected by our party for excavation. Our workman first removed the surface soil by spading and shoveling, to a depth of about six inches, and threw it to one side. This soil was found to consist of a fine yellow-brown sand, mixed with humus and other carbonaceous matter, which gave it a prevailingly dark color. All objects thrown out with this soil were collected and listed under 'A' and 'B;' the first representing the preliminary spading, the second the shoveling.

The objects consisted of fire-cracked stones; unworked pebbles, from size of a cobble to that of a robin's egg; chips and flakes, mostly of chert, but a few of argillite; rejects; imperfect implements; a fragment of anthracite coal; a cinder; a piece of oyster (?) shell; a piece of modern pottery; unclassified stones, mostly broken or chipped. The entire collection apparently represented the ordinary refuse of an Indian camping ground, with a few indications of modern civilization.

At the southern end of the area from which the surface soil had been removed, a pit was excavated 4 ft. by 4 ft. by 3½ feet deep. The sides of this pit were carefully squared and showed the following section:

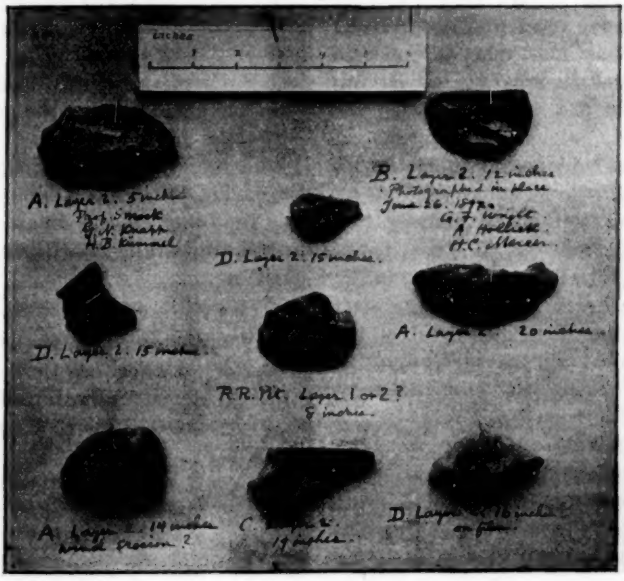

FIG. 3.—Weathered pebble, artificial flake of chert and flakes of argillite, described in the text, except one on the upper left-hand corner, found at significant depths in the yellow sand, sometimes upon or under filmings of stratification, by Professor Wright and Dr. Hollick, Professor Smock, Messrs. H. B. Kummel, G. N. Knapp and H. C. Mercer.

1. Disturbed surface soil, consisting of fine yellowish-brown sand and black carbonaceous matter, giving it a prevailingly dark color, 8–12 in.

2. Undisturbed fine yellowish sand, irregularly stratified, with streaks of red sandy clay carrying small pebbles, 2 ft. 6 in.

3. Floor of red sandy clay at bottom.

The line of demarkation between the disturbed surface soil and the undisturbed

sand could not be sharply drawn. Streaks and small pockets of black soil often extended down irregularly into what was apparently undisturbed sand. A zone was therefore recognized, below the disturbed surface soil, which we agreed to call the 'zone of doubt.' All implements or objects found in this zone were listed under 'C.' The bottom of the 'zone of doubt' was about 18 in. below the surface of the ground.

Below the bottom of the 'zone of doubt' we agreed that the sand was undisturbed by human agency and that any objects found there must be regarded as having been deposited at the same time with the sand, or possibly intruded from above, in which case some evidence or indication of such intrusion should be apparent.

The following method of investigation was then pursued:

One person entered the pit and gradually cut away the face with a trowel. As soon as any object was struck the rest of the party were notified and the sand around it was carefully removed. The distance from the bottom of the 'zone of doubt' to the object was measured and the object was then removed and examined. Each such object was immediately wrapped in a separate piece of paper, together with a memorandum of the facts in connection with it.

NOTES.

As far down as we dug we found roots of living trees, larva of June bugs (?), ants, and occasional disconnected spots or streaks of dark matter, which I took to be the remains of old decayed roots.

The undisturbed sand was found to be distinctly stratified and evidently a water deposit. Pebbles and gravel grains were not uncommon, especially in connection with the clay seams, and nearly all the chips and implements found were lying flat, although a few were more or less on edge.

Nothing but rough chipped implements (palæoliths?) and fragments were found below the 'zone of doubt' up to the time when I left (4 p. m., Saturday, June 26th), when about one-half of the main excavation had been made.

Supplementary pits were also started close to the main excavation in order that others of the party might be occupied in digging at the same time. The methods employed were identical in each case.

We failed to verify the contention that only argillite chips and implements are to be found in the undisturbed sand. Some jasper, chert and quartz flakes were also found, but argillite was the most abundant material represented.

One fine chert implement was photographed in place. The details in regard to this and other objects found in the undisturbed sand are described by other members of the party.

CONCLUSIONS.

The writer accepts the conclusions of competent authorities that the so-called palæoliths are of human manufacture and that the sand in which they occur is of glacial age.

After a careful examination there seems to be no doubt that this sand is a water deposit and that it had not been disturbed by human agency prior to the time when it was excavated by our party.

The only controversy which seems possible is over the question of intrusion from above and, in view of the facts now adduced, the burden of proof should in fairness rest with those who hold this view.

ARTHUR HOLLICK.

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*DIVERSITY OF LANGUAGES.**

THAT type of civilization cannot be regarded as ideal or forethoughtful which

*Concluding section of the address on 'Improvident Civilization' by the Vice-President of Section I., Social and Economic Science, American Association for the Advancement of Science, Detroit, 1897.

tolerates a wide diversity of tongue in which to conduct its business or store up its ideas and valuable records. As already stated, difference of speech and writing tends to keep nations and races estranged, and so makes for war rather than peace. The only progress toward a uniformity of mother tongues now visible is by the slow and fitful process of political absorption by conquest or by trade. Singularly enough the acknowledged languages of learning, the Latin and Greek, seem to be losing rather than gaining their hold upon the best literature. This is not altogether a misfortune; for languages grow and expand to conform to the ideas of those who use them; and the original connotations of words are lost in their adaptations to new conceptions. In spite of the attempt to uphold the Roman tongue by the medical and priestly professions, it is no longer that spoken by Cicero. The English of to-day differs widely from that of Chaucer. But few famous treatises in science, philosophy, history or even theology are now written in Latin; other tongues command more readers, and it no longer so well serves as a vehicle for modern ideas. No language can escape this fate. The English, which is conceded by competent observers to be as rich, as flexible and precise as any of the great European tongues—though not as simple and symmetrical as some others—has embalmed in it quite as many of the indispensable works of the world, and has besides the suffrages of a hundred and twenty millions of people to whom it is vernacular, is nevertheless susceptible of great rectification, especially in the matter of pronunciation, spelling, and in the irregularity of the verbs. The testimony of Professor Merz, in writing of 'Scientific Thought in the 19th Century,' although strangely oblivious of American contributions, as such, uses the following language, after referring to the decaying use of the classics:

> "The largest number of (Scientific) works perfect in form and substance, classical for all time, belongs probably to France; the greatest bulk of scientific work probably to Germany, but of the new ideas which during the century have fructified science the larger share belongs probably to England. Such seems to be the impartial verdict of history. During the second half of the century a process of equalization has gone on which has taken away something of the characteristic peculiarities of earlier time. The great problems of science and life are now everywhere attacked by similar methods. Scientific teaching proceeds on similar line, and ideas and discoveries are cosmopolitan property. So much more interesting must it be for those who have been born members of this international republic of learning to trace the way in which this confederation has grown up, what have been the different national contributions to its formation, and how the spirit of exact science, once domiciled only in Paris, has gradually spread into all countries and leavened the thought and literature of the world."

Nevertheless the hope of establishing either Latin or Greek as alternative world-languages, of learning, has not been abandoned among the classically educated; but all expectation of seeing the former generally adopted, at least as a spoken tongue, must have passed. If the great start of the Roman Empire, and the subsequent extension of its speech over a larger empire by the Church, did not suffice to give it precedence the chances are much against it now. Like the Roman jurisprudence it lives chiefly in its offspring. It has been more or less engrafted on the native tongues; itself is practically a dead language. The Greek survives among living tongues, but has only a limited field as such. In scientific and classical education, and notably in nomenclature, it has a future of utility as an enricher. Some of the international medical conferences are, I believe, ready to adopt it as an alternative language for their limited uses.

Meantime the business of the world becomes more and more international and interlingual. The spread of telegraphs by land and under seas, the extension of steam-

ships and steam railways across frontiers, sometimes across several of them, not only crowd the nations together, but some common code of communication between them is a desideratum—the world of commerce no less than that of letters and research waits for it. Regulation for navigation on the high seas have been contrived by the maritime nations and adapted to all; we have likewise a growing communication and conformity in astronomical, chemical and electrical literature; uniformity of standards of weight and measurement, mechanical devices and the like. In a small way, too, we have a universal language in musical notation; in the telegraphic alphabet, in the deaf-mute and in algebraic signs. How much longer will the international requirements of the whole world have to wait before a real world-language is hit upon? Must we wait until the struggle for political boundaries of the dozen or twenty several nations of Europe has concentrated the smaller ones into one dominant prodigy? If not, when and how shall the movement be begun and carried out, and by whom? The time seems to be ripe for a practical consideration of these questions, and it concerns some association of learning to do so; and for several reasons the initiative would seem to be left with the Department of Social and Economic Science.

I need not enlarge upon the magnitude of the continuing loss from the present diversity of tongues, not only in the time and effort spent in acquiring several languages, when one beside the vulgar tongue might answer all purposes of education, if that other alternate tongue were common to the great civilized nations. The waste is still greater from the publication of researches, laws, treaties and records in several dresses, all of which must be consulted by the student who would keep abreast of the advance of knowledge. The shelves of our libraries are being piled high with books of all shades of usefulness and uselessness, and an extensive ransacking of bibliographies is required to master any given topic. The most of these have only ephemeral value, but this again adds to the burden. One good effect of an alternate language of learning would be the saving from this weary plowing of the sands; the truly classic works worth preserving would in a few generations be winnowed out and a lifetime would not be consumed in mastering the works of authors long superseded, but which, as they now stand mingled side by side, are indistinguishable. An *Index Expurgatorius*, by a scientific college *de propaganda fide*, is not in accord with modern notions, but it would be a great step in advance to have all science uttered in one language and reviewed in the same. When one thinks of the ten thousand volumes printed annually by the presses in English alone, one is tempted to sympathize with that Arabian Calif who ordered the great library of his time destroyed on the ground that it was either superfluous or heretical.

Observe, there is no suggestion to invent a new language such as Volapuk aspired to be. We all know languages grow by laws of their own, and are not run into a mold. They are, however, plastic and susceptible of enrichment and improvement by human contrivance. Instances are quite numerous where one tongue has supplanted another; and the example of two or more languages being taught and used concurrently is quite common. In fact, the task of imposing a second speech on a nation is much easier than that of imposing another religious cult, or a change of metallic money standards, either of which is still deemed to be feasible.

The growth of languages may be compared to the formation of common paths and roads through the primitive wilderness; at first following the trails of wild beasts; whenever a tree falls across the path it is deflected and so continues long after the

obstruction has crumbled away. The tendency to these deviations and doublings seems to be inherent. The French is about the only tongue which has an officially appointed guardian to keep it within orthodox lines; and it must be added that none needed it so much, or has so much to be done for it remaining. What is needed, and would seem to be practicable, is the application of modern methods equivalent to the work of the civil engineer among the time-worn paths—a leveling and alignment, the taking out of kinks and détours, and introducing great precision and definiteness. It is no greater task for our time than the change to the Julian calendar was for that, and is comparable with the proposition to divide the year into 13 months of 28 days. I fear it is not the proper or congenial rôle for philologists and lexicographers whose task will come in at a later stage, in the perfecting and grafting upon the adopted alternate language. Thus far their special interest seems to lie in the diversity rather than the uniformity of tongues; and their very modest efforts to introduce a more regular spelling and pronunciation, though not entirely barren, are, by no fault of theirs, hopelessly slow of adoption. The chances of these reforms would be better if English could be adopted as a world-language; and if another were chosen they might be needless.

This Association is called upon from time to time to join in international conferences, to recommend or appoint delegates to such gatherings, and to pass upon their reports touching matters of nomenclature, classification and standards. The cause of learning has very much at stake in an extension of this same function to language. Other interests are also concerned, and whether these other interests—foreign commerce, diplomacy, telegraph or transportation—shall take the initiative, or leave it to others, there should be a joint action and representation. This subject is already attracting the attention of practical business men, who may be expected to move in the matter faster than the teachers and lexicographers. While writing, my attention has been called to an address by a business man to a Boston business club, advocating the use of English as a world language. A table quoted from Mulhall, showing the growth of the great European languages in the years 1801 to 1890, shows that the English has increased 217 per cent., while no other except the German has reached so much as 100. I have added to it a column of estimated numbers, using the same tongues at the present time, in which the lead seems to be with the English, though this is liable to be challenged by the partisans of Russia, as the official language, though not the native one, of a nearly equal number.*

Can we assume that this lead can be maintained for another century, when the Russian Empire shall touch the two oceans and the Mediterranean, or when the German Empire shall extend from the North Sea to the Bosphorus? If not, there is nothing to be lost, and much to be gained, for us, by an earlier rather than a later settlement of this queation.

There have also appeared in the daily press expressions from some learned society of Germany, which I am expecting to see authenticated any day, a willingness on

*INTERLINGUAL CONFERENCE.

Mulhall's Table of increase, 1801–1890.		Millions spoken by in 1895.
(% in 1801.)	(% in 1890.)	(Estimated.)
12.7	27.7	English . . . . 120.
19.4	12.7	French. . . . . 46.
18.7	18.7	German . . . . 37.
9.3	8.3	Italian . . . . 32.
16.2	10.7	Spanish . . . . 22.
4.7	3.2	Portuguese . . 15.
19.	18.7	Russian (?) . . 129.
100	100	
		Scandinavian . 9.
		Holland . . . 5.

their part to adopt the English as an alternate world language, provided some necessary reforms were made in spelling and orally to make it more phonetic and conformed to the classic Latin and Greek. This is a very reasonable and fit concession to be imposed, and ought to be undertaken in our own behalf without regard to the propaganda. If, by some such concessions as these, the support of Germany, and perhaps also Holland, Scandinavia and Spain, can be won, the adoption of the English is assured; and we cannot too soon convene an international conference. The Germans are handicapped by a Gothic eye-destroying alphabet and an unmusical vocal speech, and are conscious of it. This is their opportunity and ours. The claim of the French as the established language of diplomacy is recognized in Europe, but, declining even there, would be outweighed even though supported by Russia. Opposition would be likely to come from that quarter, if from any; or from a possible coalition of all the rest against the leader. But fortunately this is a case in which there is no compulsion. No nation need be bound by any recommendation of the conference, if it thought it could do better to stand out. In brief it is the counterpart of the decimal metrical system; the advantages and drift of any action would be toward uniformity sooner or later. Professor Mahaffy is out in a very pronounced opinion as to the need of rectifying English; while Mr. Havelock Ellis, I perceive, is quoted as favoring French as a second choice.

My own idea about the manner of calling, and the composition of, such an interlingual conference is that, by virtue of her much greater foreign commerce, marine interests, including telegraph, postal, consular and diplomatic intercourse, the initiative would properly belong with the mother country. Any such call from her would be sure to suggest some antagonism, and, most likely, also she would be asked to content herself with one vote on behalf of Britain and all her colonies, and attempt might be made to link in the United States. I have no idea that representation according to aggregate population would be acceptable. The most feasible plan will be by nations, or groups of nations, the offshoots and colonies not being reckoned, except in the single case of the United States, which, if expedient, could speak for Canada, too. The position of North America is one of peculiar freedom from jealousies and entanglements, and if the mother country will for this occasion graciously let her full-grown settled daughter appear in the foreground there will be less friction to encounter, and the result will be the same in either case.

There is a certain fitness aside from its expediency. American lexicographers and philologists have done more for the improvement of English in a hundred years than the British. Besides, the number of universities and students and the literary output are now comparable in volume, if not in quality, with the older nation. The ultra-conservatism of British publishers is shown by an unwillingness to handle books by American authors using the abridged spelling of certain common words where the right of argument is on our side. Again, in Asia, especially in China and Japan, which are now open to Occidental literature, science and arts, we are side by side with the British and opposed by French and German influences. If I am rightly informed, Japan is most anxious for uniformity; in fact, would accept readily a common tongue, and prefer the English. The part to be played by these islanders of the far East in international affairs cannot yet be defined, but their alliance in these bonds of peace, civilization and learning is worth cultivating.

As a rough outline of the composition of

the first conference on an alternate common language for international trade intercourse, letters, science and arts, let us suppose that whenever a sufficient number of avowals of interest in the subject shall have been received from representative bodies an invitation shall be addressed by the Secretary of State of the United States, or by this Association, or some similar body, to like associations and guilds in the following countries to choose delegates to meet at some suitable time and place in central Europe:

1. Great Britain, including colonies and India.
2. United States of America and Canada.
3. Germany, not including Austria.
4. Austria and the Hungarian and adjacent Slav states.
5. France including her colonies and Belgium.
6. Spain and Portugal.
7. Italy.
8. Greece.
9. Holland.
10. Scandinavia (Denmark, Sweden and Norway).
11. Russia.
12. The Spanish and Portuguese republics of North and South America.
13. Japan (by courtesy, not voting).

Each of these units to be represented by, say, five delegates drawn respectively from the larger international interests:

A. Political—diplomatic and jurisprudence.
B. Scientific—mechanical and medical.
C. Foreign commerce and navigation.
D. Telegraphic, foreign exchange and postal.
E. Pedagogy, publishing and philology.

Here we may have a polyglot convention of say sixty-five persons, with sixty votes representing various pursuits. All that it need do is to pass resolutions, after preamble, recommending to their respective governments that it be made lawful on and after a certain date, say January 1, 1901, or as soon thereafter as may be, to use the language adopted, and that it shall be taught in all public schools as a second, or alternating, language; and further that all documents for interlingual use, such as passports, cable and telegraph blanks, navigation charts and astronomical codes, postage stamps, money orders, letters of credit, coins, tables of metric systems, shall be inscribed in both media. Similar action on the part of the guilds and institutions themselves would be sufficient to ensure the trial.

The work of simplifying the adopted tongue, so as to make it more acceptable and more easily acquired by the rest is quite another function, belonging to a different body, and can be reported on from year to year without limit of time. Our newest dictionaries contain already some thousands of minor and acceptable changes. It would greatly add to the regularity and euphony of the English (if it should be chosen) to incorporate and substitute freely from the Spanish as written (not, however, including the eccentricities of its pronunciation) in which case the Latin and Italian methods should be taken; in this way the good will of our neighbors on the American continent might be secured, with no detriment whatever to ourselves. Computations are sometimes made to show the enormous aggregate loss from the use of redundant or silent letters in writing and typesetting. This economy is easily embraced within the larger reform outlined above.

If it is the pleasure of the Section, during this meeting, to take any action on this subject, it will give us pleasure to urge it before the Council.

RICHARD T. COLBURN.
ELIZABETH, NEW JERSEY, U. S. A.

APPENDIX.

The following resolution was subsequently adopted by the Council, and copies ordered printed for corresponding societies, universities, etc.:

WHEREAS this Association is from time to time called upon to recommend or choose delegates to international conferences seeking to promote uniformity in scientific classification nomenclature, metrology, publications, and is likewise interested in uniformity of navigation and postal regulations, and researches

at present recorded in several differing European languages; and

WHEREAS the diversity of tongues is a continuing hindrance to interchange of knowledge and literatures, seriously enhancing the cost and labor of studious pursuits, which might in large measure be avoided by the adoption by the civilized nations of an Alternate Language of Learning, Law and Commerce, and as such required to be taught in higher schools (in combination with the mother tongue) and used in interlingual correspondence and printed records; and

WHEREAS it is believed this need is felt and acknowledged by societies and corporations of several nations and awaits the initiative of some one of them to propose concerted action thereon; now, therefore, be it

Resolved, That whenever the President or Permanent Secretary of the Association shall have received from similar bodies, or from universities of Europe, expressions sufficient in number to represent a majority of the maritime peoples, signifying a desire to cooperate in an International Conference of Languages, it shall be his duty to lay the same before the Council at the next regular, or, if need be, at a specially-called, meeting, with the view to the appointment of one or more delegates to represent American Pedagogy and Science thereat, at some convenient time and place in central Europe.

In like manner the Permanent Secretary is hereby authorized to acknowledge, on behalf of this Association, receipt of such invitation for a like purpose emanating from any government, or department thereof, Institution of Learning, Technical Science, Chamber of Commerce or Finance, Telegraphic or Transportation Bureau, Postal Union or Academy of Arts and Letters, and to pledge the further attention of this Council to the same.

GEOLOGY AND GEOGRAPHY AT THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

PROFESSOR I. C. WHITE, Chairman of the Section, being in attendance upon the International Geological Congress in Russia, the Council filled the vacancy by the election of Professor E. W. Claypole, who read Professor White's address and presided over the meetings of the Section.

After the presentation of the vice-presidential address, the following papers were read:

1. 'The Geological Age and Fauna of the Huerfano Basin, in Southern Colorado,' by Professor H. F. Osborn, New York. The author reviewed the work of R. C. Hills, and concluded from recent field work that the Huerfano Lake deposits are from 800–1000 thick, consisting of upper beds equivalent to Bridger, and lower beds equivalent to Wind River and Wasatch. Below them is an unconformable series, probably Cretaceous. The distribution of deposits indicates a different extension of the lake from that given by Hills. Brief reference was made to the fossils found.

2. 'Lake Chicago and the Chicago Outlet,' by Frank Leverett, Denmark, Iowa. The paper discussed, in detail and with abundant data, the beaches and outlet of Lake Chicago, a glacial lake having southward discharge from the southern end of Lake Michigan basin, through the Des Plaines and Illinois rivers to the Mississippi.

3. 'Some Features of the Recent Geology Around Detroit,' by Frank B. Taylor, Fort Wayne, Ind. Detroit is built on moraines deposited under 200 feet of water. While the ice front was here the western half of Erie basin was filled by a glacial lake. This gives a very smooth surface contour. Shore lines and beaches are well developed. The lower courses of old tributaries of Detroit river are drowned. Streams two miles long have deep estuaries, much deeper than they could erode under present conditions, *e. g.*, Rouge River and Baby Creek. Rouge River, four miles above its mouth, has an average mid-stream depth of from 20 to 30 feet, four times deeper than would be expected from the stream's own erosion. The same is true of the St. Clair tributaries. The succession of events has been as follows: The rivers first flowed as now, but slightly higher. Then, while the upper lakes drained to the Ottawa, abandoning the St. Clair and Detroit Rivers, the streams were cutting to a base level from 25 to 30 feet lower than present river surface. Finally, a northeast uplift established existing conditions

and the refilled Detroit and St. Clair backed up into the deepened tributaries. This confirms the previously supposed temporary drainage of the upper lakes to the Ottawa.

4. 'The Lower Abandoned Beaches of Southeastern Michigan,' by Frank B. Taylor, Fort Wayne, Ind. The paper described the characteristic features, altitudes and deformations of the beaches, and showed that there are at least four important beaches at the south end of Lake Huron, below the Forest Beach of Lake Warren. Two of them, the Elkton and Algonquin, probably extend as far south as Detroit, though not yet traced to this place. The Nipissing beach is supposed to pass under Lake Huron at the south end.

5. 'Recent Earth Movement in the Great Lake Region,' by G. K. Gilbert, Washington, D. C. A comparison of gauge records and bench marks, representing a period of about twenty years, shows that, in the lake region, the land is being tilted from northeast to southwest. The rate is such that of two points one hundred miles apart the northern rises five inches with reference to the southern, in a century. At Chicago the mean lake level is rising at the rate of one inch in ten years. On account of the slight elevation of the divide between Lake Michigan and the Illinois River, a comparatively small tilting of the region will establish an outlet in this direction. It is estimated that, in about three thousand years, all of the upper lakes will discharge into the Illinois River, the current of the Detroit and St. Clair Rivers will be reversed, carrying the water of Lake Erie into Lake Huron, and the Niagara River will run dry.

6. 'A Supplementary Hypothesis of the Origin of the Loess of the Mississippi Valley,' by Professor T. C. Chamberlin, Chicago, Ill. The paper opens by a statement of two great features of the distribution of the loess of the Mississippi Valley, which are significant of its origin: (1) The loess is distributed along the leading valleys; (2) it is distributed along the border of the former ice sheet at the stage known as Iowan. These two features indicate the relationship of the loess to the great drainage valleys and to the ice sheet. Nevertheless, the vertical distribution of the loess and the presence of land shells offer great difficulties in the way of accepting the pure aqueous theory. After sketching these difficulties the paper proceeds to offer a hypothesis, which divides the honors between the aqueous and the Eolian agencies. Recognizing the strength of the arguments in favor of a glacio-fluvial origin, it postulates the limitation of the aqueous loess to the lower levels and assumes that the oscillations in the flood stages gave rise to broad, exposed flats, which when dry would be swept by the winds and the dust derived, carried to and lodged upon the uplands, giving rise to an eolian phase of the loess. The paper proceeds to discuss the necessary accommodation between the extent of the aqueous and the fluvial depositions and to compare the combined hypothesis presented with that of Richtofen.

7. 'An Account of the Researches relating to the Great Lakes,' by Dr. J. W. Spencer, Washington, D. C. The author presented an exhaustive review of the gradual development of our knowledge of the Great Lakes, stating the various opinions that have been, and are now, held in regard to their origin, changes and probable future. Being in itself largely a summary, the paper scarcely admits of condensation to the limits of a brief abstract.

8. 'Changes of Level in the Glacial Formations of the Alps,' by Professor Albrecht Penck, Vienna, Austria. The deposits belonging to the glacial period of the Alps must, as to their origin, be divided into true moraine and fluvio-glacial. The moraine deposits occur everywhere where glaciers

have existed, and are not confined to certain levels. The fluvio-glacial gravels, as river deposits, must have had originally a slope in the direction in which the river flowed. This slope has been in some places destroyed by earth movements. This can be shown in the best way by following the oldest of the three fluvio-glacial deposits, the high-level gravel. It formed originally an extensive covering of the low ground of the north Alpine Piedmont region, sloping to the north. Now it forms a series of very flat folds which run parallel to the foot of the western Alps. These folds can be followed from the mouth of the Aar into the Rhine, and from the mouth of the Lech into the Danube, a distance of 250 miles.

The earth movements of the glacial period in the Alps are of a different type from those about the grand American lakes. The American belong to a warping of the earth's crust, which is independent of structural lines; the sub-Alpine shows that the folding of the Alpine system was still going on in early glacial times in the foreland. Whether or not this folding was connected, as Heim assumes, with a bodily sinking of a whole mountain chain, could not be ascertained.

9. 'A Suggestion in Regard to the Theory of Volcanoes,' by Professor W. N. Rice, Middletown, Conn. The distribution of volcanoes gives a clue to their cause. As a generalization, it may be stated that volcanoes occur in localities where there has been recent elevation. Assuming the interior of the earth to be potentially liquid, relief of pressure by crustal uplift might cause fusion, the fused material finding exit by fissures produced during the movement. This idea has been suggested before, but seems deserving of the more explicit formulation presented in this paper. To the objection that contemporaneous sheets of igneous rocks occur in thick masses of sediment, indicating subsidence, it may be answered either that igneous rocks come from adjacent rising areas or that they point to oscillation of movement, progressive subsidence being interrupted by epochs of elevation.

10. 'The Ores and Minerals of Cripple Creek,' by H. P. Parmelee, Charlevoix, Mich. After a short review of the rocks and ores of the region, the important minerals were mentioned, and some described in detail. Specimens of several species were shown, among them a very perfect crystal of calaverite.

11. 'Observations on the Genus Barrettia,' by Professor R. P. Whitfield, New York. The author referred to the original discovery of the fossils and description of the genus by S. P. Woodward, with its reference to the Rudistidæ; he then pointed out several peculiar features of the fossils not noticed in the original description and called attention to their strong resemblance to cup corals, and their general radiate structure. The description was based upon a large collection of specimens obtained from Jamaica, W. I.

12. 'Ice Jams and what they Accomplish,' by Dr. M. A. Veeder, Lyons, N. Y. The paper dealt with the effect of ice forced through river channels, partly floated and partly grounded on the land through choking of the outlets of lakes. The channeling of rock surfaces in the St. Lawrence valley and the formation of parallel ridges in Salina marls and shales were ascribed to this action.

13. 'The Lower Carboniferous of Huron County, Michigan,' by Dr. A. C. Lane, Houghton, Mich. This paper, read by Mr. W. F. Cooper, described the Bayport limestone, the Michigan salt group and the Marshall series, as exposed along the 'Thumb' of the Lower Peninsula. The localities were arranged in their proper position in the geological column, and it was shown that the rocks have a greater

thickness than was formerly supposed. Preglacial stream valleys were also treated.

In the absence of the authors the following papers were read by title:

14. 'Progress of Hydrographic Investigations by the United States Geological Survey,' by F. H. Newell, Washington, D. C.

15. 'Stylolites,' by Professor T. C. Hopkins, State College, Pennsylvania.

Tuesday was given to the Geological Society, and Wednesday afternoon the Section met with Section H, joining in the discussion of the human relics found in the Trenton gravel.

C. H. SMYTH, JR.

HAMILTON COLLEGE.

GEOLOGICAL SOCIETY OF AMERICA.

THE ninth summer meeting of the Society was held at Detroit, August 10th, under the presidency of Professor Edward Orton.

The Secretary announced the election of nine fellows.

The following papers were read:

1. 'The Granite Mountain Area of Burnet County, Texas,' by F. W. Simonds. The area described embraces about fifty square miles, from which the overlying strata have been removed, and the granite reduced to a plain, except at Granite Mountain and Johnson's Rock, which rise about one hundred feet above the general surface. The granite is a biotite granite and is quarried on a considerable scale, affording an excellent building material. After reviewing the opinions of Walcott, Hill and Comstock in regard to the age of the granite, the author concluded that the intrusion accompanied post-Carboniferous disturbances, and may have been as late as Cretaceous.

2. 'Stratigraphy and Structure of the Puget Group, Washington,' by Bailey Willis. The Eocene and Miocene strata adjacent to Seattle and Tacoma are folded and faulted in a manner closely analogous to that of the Appalachian region, but the compressing force acted from the west instead of the east. The fresh-water Eocene is much like the eastern Carboniferous, consisting of arkose sandstones and clay shales containing iron carbonate nodules, with beds of coal or black shale every one hundred, to one hundred and thirty, feet. The total thickness exceeds eight thousand feet. When slightly disturbed, the coal is lignite, but as the amount of disturbance increases there is a passage into steam coal with cubical fracture, and, finally, into coking coals. The coals, being planes of easy slipping, have greatly affected the folding, and have themselves often been crushed to powder.

3. 'The Loess as a Land Deposit,' by J. A. Udden. Observation indicates that the air is not depositing dust in sufficient quantities to build the loess, which spreads over such great areas, at elevations ranging from 300 to 3,000 feet. But the amount deposited varies greatly and may have been much larger in early post-glacial times. The loess closely resembles undoubted wind-blown deposits, while in its uniformity and prevailing lack of bedding plains it is quite different from most aqueous sediments. On the whole, the actual phenomena exhibited by the loess seem to accord better with the hypothesis of Eolian origin than with any other.

4. 'Analogy between Declivities of Land and Submarine Valleys,' by J. W. Spencer. With the aid of diagrams, the author pointed out the close resemblance existing between subaërial and submarine valleys, particularly in the Antillean region. He concluded that such similarity of topography must indicate a common origin, and that the present sea bottom must be a submerged land surface. This shows a sinking of ten to fifteen thousand feet in the Antillean basin, which was probably compensated by an elevation in the region of Mexico.

5. 'Great Changes of Level in Mexico, and the Inter-Oceanic Connections,' by J. W. Spencer. The geological basement of Mexico is a post-Cretaceous base level, out of which rise the higher mountains. A deep-water formation of Mio-Pliocene age rests unconformably upon the Cretaceous. These rocks, by their distribution, point to a Pliocene submergence, with 'canals' or straits connecting the Pacific and Gulf waters. This conclusion is further substantiated by the similarity of the shallow water faunas on the opposite sides of the isthmus, the deeper water forms being quite unlike. This connection was broken by a recent, almost modern, elevation, amounting, in some places, to 8,000 feet.

6. 'The Origin of the Gorge of the Whirlpool Rapids of Niagara,' by F. B. Taylor. From the falls to the cantilever bridge the Niagara gorge is broad. At the latter point it suddenly narrows, and the diminished width continues to within eighty rods of the whirlpool. From here to Lewiston it is wide again. The author ascribed the formation of the broad upper and lower gorges to the action of the great cataract carrying the entire discharge of the upper lakes. The narrow gorge of the whirlpool rapids was referred to a smaller cataract, when the three upper lakes were draining through the Nipissing into the Ottawa. Thus, the latter gorge, being cut by a comparatively small river, must have required for its formation a long time, probably not less than 20,000 to 25,000 years. This considerable period must, therefore, be reckoned with in estimating post-glacial time.

7. 'The Glacial Drainage of the Simcoe Area in Ontario,' by F. B. Taylor. In this paper the author gave reasons for believing that during a period when the Nipissing outlet was closed, a drainage channel was established from Georgian Bay through the River Trent.

8. 'Exposures near Detroit of Helderberg Limestone, and Associated Gypsum Salt, and Sandstone,' by W. H. Sherzer. The highest rocks exposed in southeastern Michigan are Upper Helderberg, nearly or quite equivalent to Corniferous. They are very pure limestones with chert beds, and have a thickness of 100–160 feet. Beneath them is a series equivalent to the Water-lime, chiefly drab dolomites, sometimes oölitic. Some distance below the top of the Water-line is intercalated a bed of white sand, almost pure quartz, many of whose grains show secondary enlargment. Extending to a depth of over 2,000 feet beneath Detroit is a series of beds of gypsum and rock salt, the latter aggregating a thickness of five hundred feet in three beds. Thus, Detroit possesses, in almost unlimited quantities, the pure limestone and salt which are the raw materials of the soda ash and caustic soda industry.

The following papers were read by title:

9. 'Notes on the Geology of the Lower Peninsula of Michigan,' by A. C. Lane.

10. 'The Nomenclature of the Carboniferous Formations,' by R. T. Hill.

11. 'Ice-transported Boulders in Coal Seams,' by E. Orton.

12. 'Clay Veins Vertically Intersecting Coal Measures,' by W. S. Gresley.

C. H. Smyth, Jr.
Hamilton College.

REGENERATION IN OLIGOCHAETE WORMS.

Professor T. H. Morgan, of Bryn Mawr, has made the following summary of recent studies upon regeneration in worms:*

1. Pieces of the anterior end of Allolobophora fœtida containing less than thirteen segments rarely, if ever, regenerate posteriorly, yet such pieces can regenerate very quickly anterior segments if these are cut off. The result shows that the lack of power of the anterior pieces to regenerate

*Archiv für Entwickelungsmechanik, V. Band, 3 Heft.

posteriorly does not depend, directly, on the size of the piece. 2. Anterior ends containing from thirteen (?) to thirty segments sometimes regenerate posteriorly, but only after a long time and in general, the shorter the piece (*i. e.*, the nearer the cut to the anterior end) the longer the interval before it begins to regenerate, and the fewer the pieces that regenerate at all. 3. Similarly very short posterior pieces do not regenerate anteriorly; longer pieces from the posterior end regenerate occasionally, but only after a long interval of time. In general the shorter the posterior piece the longer the time before the piece begins to regenerate anteriorly. 4. The experiments show that Weismann's hypothesis of latent cells is insufficient to explain the phenomena of regeneration, because it can not account for the delay in regeneration of a lost part under the circumstances given above. 5. Short pieces from the middle of the worm sometimes regenerate both anteriorly and posteriorly. 6. If a worm be cut in two pieces and then the anterior end be cut off again from the anterior piece, the middle piece will regenerate posteriorly at the same rate and time as though the anterior end had not been cut off. 7. If posterior ends of two worms be sewed together and if then one of the ends has a part cut off, the part that regenerates is like the part removed; *i. e.*, a new posterior end, and not a new head regenerates.

The power to regenerate is, in some cases, of the greatest use to an animal since it enables the animal, if injured, to reproduce the lost parts. It is, therefore, surprising to find the phenomenon of regeneration almost entirely neglected by the advocates of the theory of natural selection. Darwin scarcely alludes to the matter and most of his followers make little or no reference to the subject. Weismann, however, in his recent book on the Germ Plasm has opened up the question. A quotation will serve to show how successfully he has treated the matter from the selectionists' standpoint. "The power of regeneration in any particular part cannot depend only on the conditions which exist as regards the species under consideration; it must also be due to arrangements for regeneration which have been transmitted by the ancestors of the species. Leaving the question aside, and regarding the power of regeneration as merely depending in each individual case on adaptation, we should arrive at some such conclusion as the following: the provision of the cells of a certain part with supplementary determinants for the purposes of regeneration depends primarily on the liability of this part to frequent injury * * * * a useless or almost useless rudimentary part may often be injured or torn off without causing processes of selection to occur which would produce in it a capacity for regeneration." How an infinite number of injuries to a part could ever produce in it a capacity for regeneration is far from clear. Injured animals would be, on the whole, at a disadvantage in the struggle for existence; if some of them have the power to regenerate already they are neither better nor worse off than those that have not been injured. Just how injured animals would ever be able in each generation to obtain an advantage over uninjured animals is by no means self-evident. In my experiments, for instance, I find that only rarely do posterior ends of worms cut in the middle regenerate anteriorly, and even in those cases where this happens the regeneration is almost always imperfect. Does this mean that as yet an insufficient number of these worms have been injured in this way? In the course of time if more worms are injured by accidents, will Allolobophora fœtida acquire a capacity for regenerating the anterior end? Are we to consider seriously this interpretation of the selection theory?

THE SURVEY OF THE FOREST RESERVES.

Professor Chas. D. Walcott, Director tor of the United States Geological Survey, has just returned to Washington after an absence of three months and a-half spent in the field.

In the course of his journeys Mr. Walcott gave a short time to geologic investigation in the Sierras, on his own account, and to attending to the general affairs of the bureau. He was engaged principally, however, in looking after the surveys and investigations of the suspended forest reserves, a work only just entered upon by his bureau, and to start which Congress at the last session made an appropriation of $150,000. This work was started and got under way in July. In connection with this branch of work topographic and subdivision surveys are being made in nine of the forest reserves of the West, the field being divided between two of the topographic divisions or sections of the Survey. Mr. R. U. Goode, of the Pacific Section, is making surveys in the Bitterroot, the Priest River and the Washington reserves, while Mr. Douglas, of the Rocky Mountain Section, is surveying the Lewis and Clarke and the Flathead reserves of Montana, the Big Horn and Téton Reserves of Wyoming and the Uinta Reserve of Utah. Before the season closes Mr. Goode will also work in the San Jacinto Reserve of southern California, sending some of his parties into that area when they are driven by bad weather out of the more northern reserves.

Data on which to base definite statements of the results of the surveying work of the season are not yet available. Preceding the topographic work proper triangular and spirit-level lines are being run, except in the higher and more rugged regions, where there are no roads and trails. The subdivision surveys are being made in the same manner as the subdivision surveys in Indian Territory. Another feature is the outlining by the surveyors, in the course of their other work, of all wooded and forested areas, and another is the erection, at suitable intervals, of permanent bench marks, to mark the elevation above sea level. There are from one to three parties in each reserve. It is yet too early for definite statements of the results of the season's work, but such data as are at hand indicate that the surveys have progressed satisfactorily, considering the lateness of the start, the rugged character of much of the country traversed, etc. In the Washington and Flathead Reserves work was discontinued at the close of September on account of snow and otherwise unfavorable weather, but at last reports it was still going on in all other localities.

The topographic maps which will result from the topographic surveys will be on the scale of two miles to the inch with 100 foot contour intervals. These will serve as base maps for the representation of forestry details, agricultural and mineral lands, etc. The subdivision surveys will enable the demarkation of tracts of land for agriculture, for minerals and for timber.

The general economic investigation of the reserves is under the charge of Mr. Henry Gannett, who is assisted by seven forestry experts. The reserves, and the experts assigned to each, are the Black Hills Reserve, H. S. Graves; the Big Horn Reserve, F. E. Town; the Priest River Reserve and the eastern part of Bitterroot Reserve, John B. Leiberg; the eastern portion of Washington Reserve, W. Y. Steele and M. W. Gorman; the western portion of the Washington Reserve, H. B. Ayers, and the Téton Reserve, Dr. T. S. Brandegee. Work was begun in these several reserves at various dates between July 1st and August 15th. It has since progressed satisfactorily in all the reserves, according to Mr. Gannett, who has just returned to Washington and made his first report of the season. The first area to be completed, Mr. Gannett says, is the

Priest River Reserve, which was finished about the end of July; the second the Téton, finished about the middle of September. The Big Horn Reserve is practically completed at this date. Work in the other areas is still in progress, or was when Mr. Gannett reported.

The information obtained by Mr. Gannett's division touching these reserves relates to the condition, value and character of the timber; the density of undergrowth; the prevalence of fires in past times; the extent of cutting; the location and extent of lands more valuable for other purposes than for timber; the amount of settlement within the reserves, and the demand for timbers in their neighborhood. It is expected that the results obtained will be of value to the government in delimiting the boundaries of the reserves and in their future administration.

W. F. MORSELL.

WASHINGTON, October 20, 1897.

CURRENT NOTES ON ANTHROPOLOGY.

MAYA DAY SYMBOLS.

IN the 'Sixteenth Annual Report of the Bureau of American Ethnology,' Professor Cyrus Thomas has an elaborate article of sixty pages on the day symbols of the Maya year. In this study he follows the list of days as given by most authorities, beginning with *imix*. After quoting the names assigned them in five of the seven languages where this calendar was in use, he comments upon the meaning and relationship of the various terms. He departs in frequent instances from the opinions of earlier writers, but in the main agrees that in a general way there exists a connection between the terms used to designate any one day.

He has taken pains to point out in several passages some similarities in the meaning of the day-names to superstitions found among the Polynesian islanders. These are somewhat striking, but scarcely so much so as the similarities long ago pointed out between the Mexican and certain Eastern Asiatic calendars by Alexander von Humboldt. They are such as may be found the world over when we compare early attempts to measure time for religious or divinatory purposes.

The paper is abundantly illustrated, and will prove a useful work of reference to the student of Mayan hieroglyphs.

THE VIKING CLUB.

THE voyages of the Northmen to America excite an interest in their ancient memorials among American scholars. All such will welcome the periodical issued by the Viking Club under the name of *The Saga-book*. Its aim is to concentrate the study of Norse mythology, history and literature. Especial attention is given to ancient inscriptions on stone or other material exhibiting the runic and symbolic figures of the early script. The extension of the Norsemen through Scotland and Ireland was accompanied by a large amalgamation of Celtic elements. It has been shown that this reached by transmission to Iceland, where we find a considerable number of ancient Celtic names.

The *Saga-book* is handsomely printed and illustrated and may be bought of the publisher, David Nutt, London. The club itself is founded as a social and literary society for all interested in the North and its literature and antiquities. Meetings are held in London from November to June. It aims to found a library, to present and discuss papers on Northern antiquities, to encourage the publication of documents, arrange for exhibitions, etc. The subscription is ten shillings yearly, which entitles to a copy of the 'Proceedings.' Applications may be sent, care of the publisher, 270 Strand.

D. G. BRINTON.

UNIVERSITY OF PENNSYLVANIA.

BOTANICAL NOTES.

A MODEL NATURAL HISTORY SURVEY BULLETIN.

A FEW years ago the State Botanist of Minnesota began publishing botanical papers bearing upon the botany of his State in periodical bulletins under the name of 'Minnesota Botanical Studies.' These have attracted wide attention as well from the matter which they contained as the manner of their publication. The State law under which the natural history survey is conducted provides for the immediate publication of scientific contributions in the form of bulletins, in advance of the annual report, and this wise provision has enabled the State Botanist to conduct the unique publication referred to above. The first number was issued in January, 1894, since which ten more numbers have appeared, covering 1,043 pages, accompanied by eighty plates, and including fifty botanical papers. The wide range of these papers may be seen from the following synopsis :

	No. of Papers.
Morphology	1
Histology	1
Physiology	14
Phytogeography	7
Algæ	5
Fungi	4
Lichens	3
Liverworts	1
Mosses	6
Flowering Plants	7
Slime Moulds	1

Among the titles are the following: 'On the occurrence of Sphagnum atolls in Central Minnesota,' 'A revision of the Mucoraceæ with especial reference to species reported from North America,' 'A preliminary list of the mosses of Minnesota,' 'Titles of literature concerning the fixation of free nitrogen by plants,' 'A contribution to the bibliography of American Algæ,' 'On the distribution of the North American Helvellales,' 'A rearrangement of North American Hyphomycetes,' 'Contributions to a knowledge of the lichens of Minnesota,' 'The alkaloids of *Veratrum*.'

A comparison of the foregoing titles and subjects with those which commonly fill the pages of the publications of other natural history surveys justifies us in regarding this bulletin as a model which might profitably be followed in other States.

THE USEFUL FIBER PLANTS OF THE WORLD.

THE United States Department of Agriculture has recently issued a most useful nd interesting descriptive catalogue of the useful fiber plants of the world. It was compiled by the well-known statistician, Charles R. Dodge, and is the result of many years of labor. It includes 1,018 fibers alphabetically arranged, and illustrated by 102 cuts and twelve half-tone plates.

In the treatment of each fiber a briet description is given of the plant from which it is derived, and this is followed by a description of the fiber and the operations by which it is prepared for use. In cases of the more important fibers further details are given as to cultivation, preparation for the market, commercial statistics, etc.

The introductory chapter includes some interesting sections, that upon the principal fibers used commercially in the United States being especially noteworthy. From it we learn that about thirty species are used in this country, and that with the exception of the Cabbage Palmetto (*Sabal palmetto*), the Saw Palmetto (*Serenoa serrulata*) and Spanish Moss (*Tillandsia usneoides*), we are still more or less dependent upon foreign growers for our supply. Thus of the more common fibers, flax is imported from Belgium, Russia, Holland, Italy, Great Britain and Canada; hemp, from Russia, France, Belgium, Germany, Austria-Hungary, Italy and the Netherlands; jute, from India; cotton, from Egypt and Peru; raffia, (used for tie bands), from Africa; sisal

hemp, from Yucatan; manilla hemp, from the Philippine Islands, etc.

Two classifications of fibers are presented, structural and economic.

The first is as follows:

A. FIBRO-VASCULAR STRUCTURE.

1. *Bast fibers* (of dicotyledons).
2. *Woody fibers* (of dicotyledons), from (*a*) twigs and small stems, used entire, (*b*) roots, (*c*) trunks split or cut into layers or splints, (*d*) trunks ground into pulp.
3. *Structural fibers* from (*a*) the isolated fibro-vascular bundles of the leaves and leaf stalks of monocotyledons, (*b*) the whole stems, roots or leaves of monocotyledons, (*c*) the fibrous portions of the leaves or fruits of certain dicotyledons.

B. SIMPLE CELLULAR STRUCTURE.

4. *Surface fibers*, including (*a*) hairs on seeds, (*b*) hairs from stem surfaces, and (*c*) epidermal strips from leaves, as of certain palms.
5. *Pseudo-fibers*, including (*a*) certain mosses, as species of sphagnum, (*b*) certain seaweeds used for packing, (*c*) certain seaweeds for cordage, (*d*) the mycelium of certain fungi.

Economically, fibers are classified as follows:

A. *Spinning fibers*, including (1) fabric fibers, (2) netting fibers, (3) cordage fibers.

B. *Tie material.*

C. *Natural textures*, including (1) tree basts with tough interlacing fibers, as in the 'lace barks,' (2) ribbon or layer basts, (3) interlacing structural fibers or sheaths, as cocoanut sheaths.

D. *Brush fibers*, including (1) prepared fibers from isolated fibro-vascular bundles, (2) fibers from roots, flower pedicels, etc., (3) twigs and splints.

E. *Plaiting and rough weaving fibers*, including those used for (1) making hats, sandals, etc., (2) matting, thatching, etc., (3) baskets, (4) chair-bottoms, etc.

F. *Various forms of filling*, as (1) stuffing for chairs, cushions, mattresses, etc., (2) caulking, (3) stiffening, *e. g.*, in the manufacture of 'staff,' (4) packing.

G. *Paper material*, for making (1) textile papers, (2) bast papers, (3) palm papers, (4) bamboo and grass papers, (5) wood-pulp papers.

CHARLES E. BESSEY.
THE UNIVERSITY OF NEBRASKA.

SCIENTIFIC NOTES AND NEWS.

REPORT OF THE SECRETARY OF AGRICULTURE.

THE Secretary of Agriculture has presented to the President his report reviewing the work of the Department for the past year. The conduct of the Department under Secretary Wilson has greatly advanced the economic and scientific study of agriculture and the conditions on which agriculture depends, and the recommendations of his report will consequently carry much weight.

Mr. Wilson proposes that agents for the Department should be stationed at each of the important American legations abroad for the collection of information of interest to American farmers. The Department is endeavoring to get information from foreign countries with which to compete in the markets of the world regarding crops and prices, and is also taking steps to ascertain what crops are grown on different thermal lines, so that seeds and plants may intelligently be brought to this country to assist in the diversification of our crops and add to their variety. There is a necessity for American agents, educated in agricultural science, in every foreign country to which are sent reports.

Mr. Wilson recommends an increase in the appropriations in aid of the Bureau of Animal Industry, of the Weather Bureau and of the publication offices. He thinks the Department should be enabled to place the results of important operations at agricultural colleges before the entire country, so that the farmers of each State may benefit from the work done in

other States. The present method of securing crop reports is criticised, and the employment of a statistical agent in each State with paid reporters is recommended.

Mr. Wilson not only believes that the exports from America can be greatly increased, but that nearly all the imported agricultural products, valued at $400,000,000, could be and should be produced at home.

THE GEOLOGICAL SURVEY OF WEST VIRGINIA.

At the last session of the Legislature of West Virginia an act was passed establishing a State Geological and Economic Survey, to be under the direction of a commission consisting of the Governor, State Treasurer, President of the State University, Director of the Agricultural Experiment Station, and President of the State Board of Agriculture. Three thousand dollars a year was appropriated to carry on the work. The act is similar to that establishing the Geological Survey of Maryland, in which the corporation of the Johns Hopkins University was secured and the Survey inaugurated in a manner so promising for science and economic usefulness.

The commission of the West Virginia Survey met in Wheeling last month and organized, electing Governor Geo. W. Atkinson President; Mr. M. A. Kendall (State Treasurer), Treasurer; Professor T. C. Atkeson (President of the State Board of Agriculture), Secretary; Mr. J. H. Stewart (Director of the Experiment Station), Superintendent of the Department of Economic Biology; and President Jerome H. Raymond (West Virginia University), Executive General Officer. Dr. I. C. White was elected Superintendent of the Survey. He is in Europe now, and it is not yet known whether he will accept, but he will return soon, and then the real work of the Survey will begin. Professor S. B. Brown, professor of geology in the University, was elected First Assistant Geologist and Curator of the Collections. Professor J. L. Johnston, professor of civil engineering, has been appointed Assistant Geologist, with the special duty of locating the meridian lines of each of the county seats of the State. The headquarters of the Survey are at the West Virginia University, Morgantown.

THE NEW YORK ZOOLOGICAL PARK.

A letter from Mr. William Hornaday, Director of the New York Zoological Park, published in the *Critic*, calls attention to a fact perhaps not known to those who have objected to increasing the attraction of the park lands north of the Harlem River by using a small part of them for botanical and zoological gardens. Mr. Hornaday writes:

"The Hon. W. W. Niles, who was a member of the Commission which (in 1884) selected the 4000 acres of farm lands in the Annexed District, now included in the four great parks, declares most positively that in determining the total area of land to be condemned and purchased by the city the Commissioners made the area as large as it is in order to provide abundant room for the large zoological and botanical gardens which they felt sure would soon be established by the city. In other words, it was the deliberate *expectation and intention* of the Commissioners that both of the institutions now complained of should find homes on some of the lands then acquired. The Commissioners very wisely did not attempt to assign sites for the zoological and botanical gardens. In choosing a home for the former, the Zoological Society naturally inferred that the site which would be the most accessible to the public, and also immeasurably the best for the animals, was the proper one to choose. There are 3,500 acres of public parks in the Annexed District, untouched by the two scientific gardens, or five and one-half square miles. Is not that enough? Of the 261 acres alloted to the Zoological Park, the collections will be located on the least attractive portion; fully one-half of the total area (*all* of the picturesque portion) has been set aside as pleasure grounds, only."

THE INTERNATIONAL LEPROSY CONFERENCE.

At the conclusion of the recent International Leprosy Conference at Berlin the secretaries drew up a summary of the results in English, German and French, intended especially for the governments who had sent delegates. The conclusions are as follows:

1. As might be expected, a considerable portion of the proceedings has been in connection with the bacillus of leprosy, which the Confer-

ence accepts as the virus of the disease, and which has been now known to the scientific world for upwards of twenty-five years through the important discovery of Hansen and the able investigations of Neisser.

2. The conditions under which the bacillus grows and develops are still unknown, as well as the way of its invasion into the human system; but from the discussions at the Conference it seems probable that a unanimity of opinion will soon prevail with regard to the modes of its dissemination throughout the body.

3. Very interesting observations have been brought forward concerning the large quantities of bacilli which are eliminated from the bodies of lepers through the skin and the buccal and nasal mucous membranes. It is desired that these observations be confirmed where opportunities occur. This question is important to those who are entrusted with the care of the public health, as we have to acknowledge that leprosy is a contagious disease.

4. Every leper is a danger to his surroundings, the risk varying with the nature and extent of his relations therewith and with the existing sanitary conditions. Although in the poorer classes the leper is especially a source of danger to his family and fellow workers, it cannot be denied that cases frequently occur also in the higher social circles.

5. The theory of the heredity of leprosy has lost ground in comparison with the now generally accepted opinion of its contagiousness.

6. The treatment of leprosy up to the present time has only had palliative results. Serumtherapy, so far, cannot be said to have been successful.

7. In view of the virtual incurability of leprosy and the serious and detrimental effects which its existence in a community causes, and considering the good results which have followed the adoption of legal measures of isolation in Norway, the Leprosy Conference, as a logical issue of the theory that the disease is contagious, has adopted the following resolution, proposed by Dr. Hansen and amended by Professor Besnier: (*a*) In countries where leprosy forms *foci* or has a great extension, isolation furnishes the best means of preventing the spread of the disease. (*b*) The system of obligatory notification, observation and isolation as carried out in Norway is recommended to all nations with local self-government and a sufficient number of physicians. (*c*) It must be left to the administrative authorities, after consultation with the medical authorities, to take such special measures as are applicable to the special social conditions of the districts.

GENERAL.

MR. HENRY S. PRITCHETT, Ph.D. (Munich), professor of physics and astronomy in Washington University, St. Louis, has been appointed by the President, Superintendent of the Coast and Geodetic Survey in the place of Gen. W. W. Duffield, resigned. Professor Pritchett was from 1878 to 1880 Assistant Astronomer at the Naval Observatory, Washington. He has engaged in work for the Survey in China and Japan as well as in the United States. We regret to notice the statement that Professor Pritchett is a Republican in politics, but hope that this is a mere accident and does not mean that the head of the Survey is liable to be changed every four years. There is every reason to believe that the Survey will now be conducted with the greatest efficiency and will contribute largely to the solution of the important practical and scientific problems with which it is charged.

IT is announced that the conference of delegates from the United States, Russia and Japan in regard to the seal fisheries has resulted in an agreement recommending the material limitation or complete suspension of pelagic sealing. Professor D'Arcy Thompson is now in Washington and it is expected that Mr. Macoun, the Canadian Minister of Marine, will shortly arrive, and that the conference between the United States, Great Britain and Canada will soon be held.

PROFESSOR F. F. MARTENS, professor of international law in the University of St. Petersburg, has been chosen an arbitrator in the question of the Venezuela boundary.

DR. H. HICKS, President of the Geological Society, London, has been awarded the jubilee medal established in commemoration of the sixtieth anniversary of the Queen's reign.

DR. EDMUND DRECHSEL, professor of physio-

logical and pathological chemistry and of pharmacology in the University of Berne, died on September 22d at Naples, where he was working at the zoological station on the chemistry of invertebrates. Drechsel was born at Leipzig in 1843 and was assistant to Kolbe, then professor of chemistry, and to Ludwig, then professor of physiology in that University. He was made associate professor at Leipzig in 1878 and was called to Berne in 1880. Physiological chemistry has recently suffered most serious losses in the deaths of Hoppe-Seyler, Baumann, Heidenhain and Drechsel.

DR. ALEXANDER MILTON ROSS died at Montreal on October 27th. He had made extensive collections of the fauna and flora of Canada and was the author of 'Birds of Canada' (1872); 'Butterflies and Moths of Canada' (1873); 'Flora of Canada' (1873); 'Forest Trees of Canada' (1874); 'Ferns and Wild Flowers of Canada' (1877); and 'Mammals, Reptiles and Fresh-water Fishes of Canada' (1878).

SIR PETER LE PAGE RENOUF, the eminent Egyptologist, died in London about the middle of October at the age of seventy-four years. He was the keeper of the Egyptian and Assyrian antiquities of the British Museum from 1885 to 1891, and was the author of several important publications, including the Hibbert lectures on 'The Religion of Ancient Egypt' (1897), and an edition of the 'Papyrus of Ani.'

THE following deaths are also announced: Dr. Leopold Auerbach, assistant professor of physiology in the University of Berlin; Dr. Mietschke, the German naturalist and entomologist; Dr. Hjalmar Heiberz, professor of pathological anatomy in the University of Christiania, and Dr. R. Branchat, professor of hygiene in the Medical Faculty of Granada.

IT is said that the Norwegian government will not only allow Captain Sverdrup the use of the 'Fram,' but will give him $50,000 for an outfit. According to *Petermann's Mitteilungen* Captain Sverdrup had given up the intention of making investigations between Spitzbergen and Greenland, and it had been decided that he should proceed up Baffin Bay and Smith Sound to the part of the Arctic ocean north of Greenland, which is the region Lieutenant Peary had previously announced his intention to explore.

A CABLEGRAM from Christiania states that the government has instructed the Governor of the Province of Tromsöe, the most northern province of Norway, to charter a steamer at the expense of the state, to provision it for six months and to send out a relief expedition for Herr Andrée, the aëronaut, who ascended in his balloon, the 'Eagle,' on July 11th. The relief steamer will start in three days' time from Tromsöe, and will proceed to Spitzbergen.

THE Imperial Russian Geographical Society will send at once an expedition, under the direction of M. Dmitrieff, to Abyssinia for anthropological research.

THE Austrian steamship 'Pola,' Captain Paul von Pott, has again gone to the Red Sea for scientific explorations, and will this year cover the ground between Dschedda and Aden. Dr. Franz Steindachner, the eminent ichthyologist, has charge of the zoological work, and explorations will also be made in physical oceanography.

PROFESSOR CHARLES BURCKHALTER, of Chabot Observatory, Oakland, Cal., has left for Hong Kong, and will proceed to India with his instruments for the purpose of observing and photographing the approaching total solar eclipse of the sun.

PRINCE PETER ALEXEIEVITCH KRAPOTKIN, the eminent Russian man of science, President of the Imperial Geographic Society, lectured in Washington on October 22d, before the National Geographic Society, on Russia and Siberia, dwelling at length on the geography of Siberia, which he compared with that of North America.

PROFESSOR ELLIOTT has been nominated for the presidency of the London Mathematical Society.

THE Astronomical Society of France held on October 6th its first meeting for the season. The President, M. Cornu, opened the session with an account of the astrophysical work of Fizeau. MM. Callandreau and Moye presented papers on the trajectories of comets and meteors.

THE Agnew Memorial Pavilion of the Hospital

of the University of Pennsylvania was opened on October 15th. It has been erected at a cost of $150,000, and in addition to 120 beds, dispensary rooms, etc., contains three ampitheaters, one with a seating capacity of 270.

MR. WILLIAM C. TODD, of Atkinson, N. H., has given the Boston Public Library $50,000, the income of which is to be used for the purchasing of newspapers.

THERE has been held at Sydney, New South Wales, during the present summer, an electrical exhibition at which engineering machinery and scientific apparatus were well represented. A large number of exhibits were sent from America and Great Britain.

THE Zoological Park, Washington, has received three young buffaloes purchased from the Allard herd in Montana.

THE Kingsley Laboratory, the new scientific building of the Worcester Academy, was dedicated on October 30th. Addresses were made by President Eliot, of Harvard University; President Hall, of Clark University, and President Mendenhall, of the Worcester Polytechnic Institute. The building is said to be the best equipped for the study of the sciences possessed by any secondary school.

AT a meeting of the Council of the Australasian Association for the Advancement of Science on September 8th the honorary Secretary, Professor A. Liversidge, stated that he had received the titles of the following addresses: Section C—Geology and Mineralogy: Professor Hutton, F.R.S., of New Zealand, upon 'Early Life on the Earth.' Section F—Anthropology and Ethnology: A. W. Howitt, of Melbourne, 'On the Origin of the Aborigines of Tasmania and Australia.' Section I—Sanitary Science and Hygiene: The Hon. Allan Campbell, of Adelaide, 'Australian Sanitation, a Jubilee Retrospect.' Among other papers announced in addition to those we have already noticed are the following bearing upon the natural history of Australasia: For Section C—Geology and Mineralogy: 'Notes on the Physiography of the Parish of St. George, New South Wales,' by E. J. Statham; 'On Some Effects of the Dynamo-Metamorphism in the Omeo District, Victoria,' by A. W. Howitt; 'Metallurgical Methods in Use at Broken Hill,' by G. W. Blakemore; two papers by Mr. J. C. H. Mingaye, on 'Occurrence of Phosphatic Minerals at the Jenolan Caves, with Analyses,' and 'Notes and Analyses of some New Wales Phosphate Minerals.' For Section D—Biology: 'On the Physiology of the Brain of Marsupials,' by Dr. J. F. Cashman; 'Notes on the Fertilization of some North Australian Plants,' by Nicholas Holtze; 'A Few Words about the Flora of the Islands of Torres Straits and the Mainland about Somerset,' and 'Notes on Plants of the Rabbit-infested Country, Bulloo River, Southwest Queensland,' with Photographic Illustrations,' by J. F. Bailey. For Section E—Geography: 'The Earliest Discoveries in New Guinea and Polynesia,' by James MacClymont; 'Gramineæ of Western Australia,' 'Salsolaceæ of Western Australia,' and 'The Supposed Poisonous Plants of Western Australia, by F. Turner.

Two new museums will be opened at St. Petersburg in connection with the Army Medical Academy, one for psychiatry and one for neurology. The former will include objects illustrating the arrangements of asylums and the pathology of insanity, while the latter will illustrate the anatomy of the nervous system.

A PUBLICATION issued from the French Ministry of Finance gives some very elaborate statistics as to the quantity of wine, beer, cider, and alcohol consumed in the country. From the summary in the London *Times* we learn that the total quantity is 1,575,000,000 gallons, representing about 1¼ litres per diem for the whole population of France. Out of the total quantity consumed 967,000,000 gallons are wine, 395,000,000 gallons cider, 202,500,000 gallons beer, and 36,800,000 gallons alcohol. It is scarcely necessary to say that, while the greater quantity of the wine is consumed in the large towns, the cider is nearly all drunk in the country, especially in Normandy and Brittany, and the official statistics give a table showing what is the consumption of wine in the 47 towns with over 30,000 inhabitants. The figures, as might be expected, vary very much, the annual consumption being largest at Boulogne-sur-Seine (59 gallons), Nice (56 gallons) and St. Etienne (54 gallons), while Paris is only 13th

on the list with 45 gallons. In none of the large towns in the South of France does the consumption fall below 30 gallons, but in seven large town in the North (Lille, Boulogne-sur-Mer, Dunkirk, Caen, Calais, Roubaix and Turcoing) it averages only six gallons. Another table gives the consumption of alcohol, and here Rouen, Cherbourg and Le Havre head the list with an annual total of nearly four gallons per head of the population, or more than double the quantity consumed in Paris.

UNIVERSITY AND EDUCATIONAL NEWS.

THE late George M. Pullman has left $1,200,000 for the erection and endowment of a manual training school in the town of Pullman.

THE Ohio Wesleyan University has received a bequest of $35,000 from the late Stephen Watson for the endowment of a professorship.

THE West Virginia University has followed the example of the University of Chicago, and will hereafter hold continuous session, the academic session being divided into four quarters of twelve weeks each with an intervening vacation of one week.

AN increase of forty-two students over last year is reported at Harvard College. The registration is as follows: Seniors, 337; juniors, 383; sophomores, 443; freshmen, 470; specials, 163; total, 1,796.

DR. CHARLES W. DABNEY, recently Assistant Secretary of Agriculture, and special agent in charge of scientific and statistical investigations, Washington, D. C., has been elected President of the University of Tennessee.

DR. ARTHUR ALLIN, of Ohio University, has been appointed professor of psychology and pedagogy in the University of Colorado.

DR. A. W. SHEEN has been appointed demonstrator in anatomy and Mr. S. C. Mahalanobis demonstrator of physiology in the medical department of University College of South Wales, Monmouthshire.

J. GRAHAM KERR, B.A., scholar of Christ's College, Cambridge, has been appointed demonstrator in animal morphology for a period of five years from October 1, 1897, in place of Mr. E. W. MacBride, who had resigned in order to accept the professorship of zoology in McGill University.

THE electors to the professorship of pathology, Cambridge University, will meet for the purpose of proceeding to the election of a professor on Saturday, November 6th. It is expected that Dr. Kanthack will be elected.

DR. HERMANN MUNK has been promoted to a full professorship of physiology at the University of Berlin. Dr. Hettner, of Leipzig, has been appointed assistant professor of geography in the University at Tübingen, and Dr. Max Busch assistant professor of analytical chemistry and chemical technology in the University at Erlangen.

THE annual report of President Schurman, of Cornell University, is the first of these important university publications to reach us. It opens with the minute adopted by the Board of Trustees on the death of their chairman, Mr. Henry W. Sage, who had made gifts to the University aggregating $1,175,000, and had given his services in many ways. The report reviews changes in the faculty, including some account of the work of Professors Dennis (analytical chemistry), Jacoby (civil engineering), Barr (mechanical engineering), and Trevor (chemistry), who were promoted to full professorships during the year. There were in the University 1,808 students, the number being practically the same as in 1893–4, before the requirements for admission were advanced. As Cornell is sometimes said to be developing into a great technological school rather than into a university it is interesting to note that in this period there has been a decrease of about 100 students in the departments of applied science and an increase of about 100 students in the academic departments. These numbered 593 students and there were 161 graduate students. President Schurman reviews the condition and work of the different departments and colleges of the University, the library, the grounds and the financial situation. The library now contains nearly 200,000 bound volumes; 10,000 have been added during the year. The financial statement is very brief. Except money paid from the Fayerweather estate, the University has received no bequests

and but three small gifts. President Schurman's report, extending to 57 pages, is followed by appendices filling 117 pages, which give reports from other executive officers, the courses and attendance, and the publications by the University officers.

DISCUSSION AND CORRESPONDENCE.

ORGANIC SELECTION.

TO THE EDITOR OF SCIENCE: It seems to me that Professor Poulton's conclusion of the very interesting discussion on 'Organic Selection,' published in SCIENCE, October 15th, involves a serious confusion of ideas. He advocates the theory that natural selection confers on organisms the power of reacting adaptively to external forces. It is easy to conceive the effect of natural selection on an organism, assuming that the power of adaptation pre-exists; but it is incomprehensible that any amount of advantageous crossing should give the power of adaptation itself to an organism that does not already have it. Professor Poulton's arguments against that power being a property of a living organism are, I think, inconclusive. He dwells on the remarkable fact that physical forces awake responses which have to do with organic relations; but what of it? This shows only how powerful the tendency is. It is clear that any substance, animate or inanimate, reacts according to its own nature. If you drop a lighted match on to a pile of shavings, or on gunpowder, or into water, or on to a dog, certain pretty definite phenomena will occur in each case; yet the stimulus is the same; the recipient only is different. In the three earlier cases the results will be physical; in the case of the dog we reach the sphere of sensation. If the experiment be performed on a man we involve the moral sphere also, as he will either swear or refrain from swearing.

THOMAS DWIGHT.
ANATOMICAL DEPARTMENT,
HARVARD MEDICAL SCHOOL,
October 20, 1897.

A GASOLINE LAUNCH FOR FIELD WORK.

TO THE EDITOR OF SCIENCE: Last winter several papers and magazines, including SCIENCE (Vol. V., No. 119), noted the fact that I was constructing a gasoline launch for facilitating the study of paleontology and stratigraphic geology at Cornell University. Feeling that the results of this undertaking have been satisfactory in every way, and may be of interest to other investigators and teachers, I take pleasure in furnishing the following notes: First, as to what has been accomplished during the summer with this launch; second, why a naptha or gasoline launch is preferable to one propelled by steam.

July and August were spent on a long voyage from Ithaca to lower Chesapeake Bay and return, going *via* Erie Canal, Hudson River, Raritan River and Canal, Delaware River, Delaware and Chesapeake Canal, Chesapeake Bay and its many inflowing rivers. The special object of this expedition was to collect large quantities of Eocene and Miocene mollusca from Maryland and Virginia. Four students and myself constituted the party. During September a shorter excursion was made along the Erie Canal to Troy, N. Y., where Archæan, Cambrian, Ordovician, Silurian and Devonian outcrops were visited, either as they were found along the canal or at no great distance to the north or south. During term time the launch is being used for taking classes to fossiliferous outcrops along Cayuga Lake.

Now, a word as to why gasoline is preferable to steam:

1. Cost.—(*a*) Any well constructed boat 30 feet long, with a 6-horse power gasoline engine will run 800 miles on two barrels of oil; cost about $9.00 on an average, *i. e.*, a little over a cent a mile; (*b*) while on government waters no licensed engineer or pilot is required. With a few days' practice, under the direction of one acquainted with the engine, one learns his engine thoroughly and can as easily go up the Potomac to Washington as navigate his own mill-pond.

2. Freedom from government inspection.

3. There being no boiler or fire, the boat is light, roomy and cool.

4. When stopping at an outcrop no gasoline is being used. The whole machine is at a standstill, dead. But to start up and get under full speed requires less than a minute.

There are many other interesting points that ought to be touched on here, but space will

scarcely permit it. Those who may be interested in the subject are at liberty to make such inquiries of the writer as they see fit. Suffice it to say that in a country like our own, well traversed by water ways, a marine laboratory capable of rapid locomotion, at an exceedingly small cost, seems a very desirable adjunct to true university work in natural history subjects.

G. D. Harris.

Cornell University.

SCIENTIFIC LITERATURE.

Ueber Verwachsungsversuche mit Amphibienlarven. Von Dr. G. Born. Leipzig, W. Engelmann. 1897. (Reprinted from Archiv für Entwickelungsmechanik, Band IV.) 8vo. Pp. 224. Pls. I.–XI.

Professor Gustow Born is distinguished among living morphologists for the novelty and thoroughness of his investigations. It is to him that we owe the section modelling which is now so much used for the anatomical reconstruction of embryos, and which he has himself applied with brilliant results to the study of the development of the thyroid and of the heart. To him we owe also the experimental demonstration of the isotropism of the egg. In the present work we encounter again striking originality of method, coupled with extraordinary patience and thoroughness in the execution of the research. The method consists in the artificial union of two amphibian larvæ; this is accomplished by making a smooth cut on each larva, adpressing the two cut surfaces and allowing them to grow together; the natural fusion begins in half an hour to express itself and is complete in a few hours; in successful cases the united pair develop in unison and remain alive for weeks. Dr. Born's patience shows itself in the number and variety of fusions accomplished and in the exhaustive anatomical study of the developed monstrosities.

The only earlier experiments on fusion of two individuals were those of Trembley on Hydra, recently repeated by G. Wetzel. On the other hand, the announcement of Born's results has already occasioned a number of similar experiments on other animals. W. Roux appears to have first discovered the extraordinary power of the eggs and young larvæ of frogs of withstanding severe mechanical injury, and others have demonstrated the wonderful regenerative faculty of Amphibia during the early stages. Born has taken advantage of these characteristics to secure the concrescence of two individuals which develop afterwards as one. The spread of the ectoderms is the first step of the union, and there is in a short time a complete sheet of this tissue, with no visible break or trace of demarcation, extending from one larvæ to the other and covering the wound. This healing over is effected by the expansion of the sheet of ectoderms, and this expansion is not due to multiplication of the cells. Most of Born's experiments were made on larvæ of four millimeters (more or less) in length and on the following species: *Rana esculenta Bombinator igneus* and *Pelobates fuscus*; the larvæ of toads and of Rana fusca proved less favorable. Pieces of almost any size can be made to unite either of the same, or of different larvæ, and even of larvæ of two species. When the experiment succeeds such united pieces will live for about three weeks, or, in other words, until the supply of yolk material for the maintenance of growth is exhausted, but, if one or both the pieces have a digestive tract with mouth and arms, the united pieces may continue to develop indefinitely, and in such cases the blood channels of both species acquire open communication with one another, so that even when there is but one heart the blood circulates through both components. During the life of the fused larvæ, their development, their differentiation proceeds, each organ continues its progress. The development essentially follows the principles of Roux's mosaic theory.

The following schedule indicates the variety of successful unions accomplished by Professor Born:

A. Experiments on single larvæ.
   1. Pieces cut off and allowed to continue their development.
   2. Larva cut through and the pieces reunited.

B. Fusion of two larvæ, or parts of two larvæ.
   1. Both larvæ of the same species.
      a. Fusion of anterior with posterior pieces.
      b. Fusion by the ventral surfaces.
      c. Fusion of the posterior piece of one larva with the ventral side of another.

d. Fusion of the anterior piece of one larva with the ventral side of another.
e. Fusion of two posterior pieces.
f. Fusion of the heads of two larvæ.
g. Fusion of anterior pieces.

2. The larvæ belong to different species or even genera.

a. Fusion of the ventral surfaces.
b. Fusion of the posterior piece of one larva with the ventral surface of the other.
c. Fusion of an anterior with a posterior piece.
d. Fusion of the heads of two larvæ.

Every one of these unions was repeated many times, and the monograph presents an exact description of the anatomical condition of several specimens of each form of double larva, after the development had continued some weeks. These descriptions are based upon the examination of serial sections, the specimens being sacrificed on the microtomic altar. It is not using too strong a word to characterize the labor involved as enormous. The work, moreover, bears throughout the stamp of extreme conscientiousness.

It is impossible to enter here into details, but some of the general conclusions formulated by the author are so interesting that they are here presented. If, by the fusion, corresponding organs or their anlages are brought into contact they unite continuously by the concrescence of the specific tissue of the organ (the process might be appropriately named '*Histofusion*,' *Ref.*). If the anlages of unlike organs are brought in contact they become united by connective tissue. If the similar organs are hollow not only do their walls fuse, but also smooth open communication of their cavities is established, and in such cases it is not necessary that parts precisely corresponding should be joined. The different parts of the digestive tube will fuse, or the spinal cord will unite with the brain, and there will be produced a smooth passage from the cavity of one to that of the other, similarly in cases of fusion of the abdominal, pericardial or vascular cavities, of hearts, wolffian ducts, etc. Tissues are found united in this way which at the time of the union were still undifferentiated. Under certain conditions ectodermal and entodermal epithelia may become connected. The notochord takes an exceptional position in that the notochord of one piece does not concresce with that of another. The growing together of similar organs or tissues may occur in any plane or direction; there is no trace of polarity in the growth, such as Vöchting records for plants. The union of two pieces may be not only anatomical, but also physiological, and Born designates this as physiological symbiosis. It occurs in various degrees. In probably all cases the blood vessels are in open communication, so that the circulation is common to both components. A higher degree of symbiosis is marked in the cases where the intestine of the major larva has annexed a piece of the intestine of the minor, and both function together to the common advantage, or when the two larvæ have a stretch of intestine in common. The highest degree is reached when a whole end of the body, together with all its organs, is replaced, lengthened or doubled, for then the posterior piece from one larva works with the anterior piece of another, as if they were one individual. The highest degree is equally attained when the right and left halves of two larvæ are united in a single individual. The '*individuum*' is not dependent on the derivation from one egg. We have a single organism from two eggs (einen einheitlichen organismus aus zwei eiern). In the derivation from a single ovum there is no mystic, metaphysical unity.

The development, from the stage at which the experiments begin, depends upon self-differentiation of the single parts. No correlative influence of the surrounding parts can be recognized; the development is mosaic—Feis' organic areas (*organbildende Keimbezirke*) are partitioned off.

We commend this work to the attention of all biologists, and venture to predict that further important deductions will be garnered from these experiments of Professor Born, supplemented as they soon will be by additional researches. CHARLES S. MINOT.

The Concise Knowledge Library: Natural History. By R. LYDEKKER, W. F. KIRBY, B. B. WOODWARD, R. KIRKPATRICK, R. I. POCOCK,

R. Bowdler Sharpe, W. Garstang, F. A. Bather, H. M. Bernard. New York, D. Appleton & Company. 1897. 8vo. Pp. 771. Price, $2.00.

The Concise Knowledge Library's *Natural History*—a misleading title inasmuch as the book contains no botany—treats of the animal kingdom from the higher mammalia down to the protozoa. Its authors, as may be seen from the above list, are Europeans, and the forms of life they describe and illustrate are, from the American standpoint, chiefly exotic. At the same time, where an abridged encyclopedia is wanted the book will be found convenient for reference.

The preface states that "the text is illustrated by upwards of five hundred original drawings made and reproduced expressly for the work." Those of the insects and some of the other invertebrates are fair; the remainder may probably be regarded as the worst batch of illustrations published in modern times. This is due partly to faulty drawing and partly to bad ink and poor printing. The type is small, and the volume as a whole has a cheap appearance, which ill fits the high reputation of its authors.

The mammals are treated first and come in for the largest share of attention (217 pages); then the birds, reptiles and fishes, and so on down the scale. Mammalogists will be amused to hear that the American black and grizzly bears "are now considered merely as varieties of the European species," and that "the stoat or ermine (*Mustela erminea*) and the weasel (*Mustela vulgaris*) are common to Europe, North and Central Asia, and North America." Perhaps the best feature of the book is its index, which occupies nearly fifty pages and is said to contain about ten thousand references.

C. H. M.

Citizen Bird: Scenes from Bird-Life in Plain English for Beginners. By Mabel Osgood Wright and Elliott Coues. With 111 illustrations by Louis Agassiz Fuertes. New York and London, The Macmillan Company. 8vo. Pp. 430. Price, $1.50.

Among the new books awaiting the reviewer on his recent return from the West is one which, from its authorship, attractive appearance and odd title, could not be put aside. 'Citizen Bird' is its name—a book for girls and boys. It is admirably written and is illustrated by a remarkable series of original drawings.

In order to test the book the reviewer called his children, two little girls, and read them the opening chapters. The younger (aged five years) was hardly able to follow the story, though interested in certain passages, but her elder sister (aged seven) was simply spellbound from first to last; from which it may be inferred that the book will hold the attention of children of seven and upwards.

The subject-matter is very cleverly woven into a story of a family of bird lovers in their country home at 'Orchard Farm.' The owner of the farm, who is a doctor and something of an ornithologist, takes the children out into the woods and fields and tells them about the birds, their habits and their value to man; and afterward, in his 'wonder room,' gives them special talks on particular species, which are grouped by some easily remembered characteristic, as 'a silver-tongued family' (bluebirds, robins and thrushes), 'Peepers and Creepers' (creepers, kinglets, chickadees and nuthatches) and so on. The children at once become enthusiastic observers and ask innumerable questions, which, in the main, are admirably answered. The story is charmingly told, kindling an interest in bird-life which is kept up to the end. The child is taught a multitude of entertaining facts about nature, and at the same time filled with a healthy sentiment against the wanton destruction of birds and their eggs.

A few of the statements are a little lax from the standpoint of scientific precision, and one or two of the incidents narrated are liable to tax one's credulity, as when one of the boys tells of brushing newly-fallen snow from the back of a live woodcock on its nest; but the book as a whole may be commended as by far the best bird book for boys and girls yet produced in America.

The illustrations deserve more than passing notice. They are uncommonly good half-tone reproductions of wash drawings by young Fuertes, whose phenomenal talent in grasping bird attitudes was first brought to the attention of the public in Miss Florence A. Merriam's

'A' Birding on a Bronco'. The present series of more than a hundred drawings, published for the first time in 'Citizen Bird,' fully sustains the artist's reputation. As would be expected in so large a series, a few are indifferent, but by far the greater number are remarkable for beauty, fidelity and power of expression. The pictures alone are worth the price of the book.

The typography and press work are of a high order of excellence, and the publishers are to be congratulated on the exceptional skill shown by their printer in handling difficult text figures. It is refreshing to find a book in the field of popular natural history which so distinctly raises the standard for its class and at the same time is offered for sale at so low a price.

C. H. M.

The Birds of Colorado. By W. W. COOKE. Fort Collins, Colorado, State Agricultural College, Agricultural Experiment Station. Bulletin No. 37. Technical Series No. 2. March, 1897. Pp. 1–143.

In view of the geographical situation of Colorado and its topographical features, a recent bulletin by Professor W. W. Cooke, of the State Agricultural College at Fort Collins, is of more than usual interest. It is a well annotated list of all the birds known to occur within the limits of the State. Other features—general discussion, historical résumé, classification of species as regards occurrence, and bibliography—contribute to its value. Considering the opportunity which the region offers, it is somewhat surprising that the author did not also attempt a definition and discussion of the life areas of the State.

The results have been derived largely from a summing up of previously published work, but in addition to this, much valuable new matter is included in the author's own notes and those which other observers placed at his disposal. The list is a large one, the number of species and subspecies attributed to the State being 363, of which 230 are breeders. To those previously recorded, 19 species are added. This makes an enviable total, but that it may still be increased is demonstrated by the outline of yet unworked territory. Colorado will always be an interesting ornithological field, and the present paper cannot fail to be of great service as a basis and stimulus for future work there.

W. H. OSGOOD.

SOCIETIES AND ACADEMIES.

BIOLOGICAL SOCIETY OF WASHINGTON, 280TH MEETING, SATURDAY, OCTOBER 23.

MR. F. A. LUCAS described 'A Dangerous Parasite of the Fur-seal,' stating that it was a nematode of the genus *Uncinaria* found in the sandy portions of the seal rookeries of the Pribilof islands, and caused the death of many young seals. Dr. C. W. Stiles discussed the structure, habits and life history of allied forms.

Dr. C. W. Stiles spoke of 'The International Committee on Zoological Nomenclature,' and of what had been accomplished at the meeting of 1897.

Mr. M. B. Waite presented a communicatign on 'A New Peach and Plum Disease,' caused by a species of mite attacking and killing the terminal bud of the very young trees. The resulting loss in the value of the trees was considerable, as many thousand trees would be affected in one nursery. A similar disease prevailed in the Japanese quince.

Mr. F. V. Coville spoke of 'The History and Distribution of *Abies shastensis*,' which he had found in a recent trip through the Cascade mountains of Oregon to extend along the range north of the Oregon-California line as far as latitude 43° 35′. It has long been confounded with *Abies nobilis*, which is, however, a tree of more northern distribution.

F. A. LUCAS,
Secretary.

UNIVERSITY OF WISCONSIN SCIENCE CLUB.

AT the meeting of the Club on October 15, 1897, Mr. H. A. Harding, in a paper on 'Bacterial Plant Diseases,' spoke of the first discovery by Professor Burrill, of Illinois, and of the tardiness with which European investigators recognized this work. He showed the extent to which bacterial diseases occur, especially among our garden vegetables. Then followed a discussion of a disease occurring in the cauliflower and cabbage. The bacteria find entrance at the water-pores of the leaf and also through

insect wounds, and the disease causes a blackening of the fibro-vascular bundles, followed by the death of the plant.

Mr. Comstock presented an account of research work in progress at the Washburn Observatory. The meridian circle has been employed for some years by Mr. Flint in determining the relative parallaxes of a list of stars selected with reference to large proper motion. The observations for the determination of nearly 100 parallaxes are completed and the reductions are well advanced, although but a small number of definitive results have yet been reached. In so far as these have been obtained they are very satisfactory in respect both of probable error and agreement with other determinations.'

There was also described work done with the 40 cm. equatorial telescope in investigations of stellar color and upon the density of the supposed lunar atmosphere. A provisional result of the latter work is that this density cannot exceed one five-thousandth part of that of the earth's atmosphere at sea level.

WM. S. MARSHALL,
Secretary.

SCIENTIFIC JOURNALS.

The American Journal of Science, November.—'Geology of Southern Patagonia,' J. B. Hatcher: An account of observations made while collecting vertebrate fossils for Princeton University from May 1, 1896, to June 5, 1897, giving suggestions as to the age and origin of the different sedimentary deposits and the agencies which have determined the present topographical features. 'Some of the large Oysters of Patagonia,' A. E. Ortmann. 'Former Extension of the Appalachians across Mississippi, Louisiana and Texas,' J. C. Branner: Evidence for the theory announced in 1890 regarding the character and extent of the southwestern Appalachian depression. 'Combustion of Organic Substances in the Wet Way,' I. K. Phelps: Extension of the process applied in a previous article to carbon dioxide. 'Some Features of Pre-Glacial Drainage in Michigan,' E. H. Mudge.

The American Naturalist, October.—'Edward Drinker Cope, Naturalist—A Chapter in the History of Science' (Illustrated), Theodore Gill: Address by the retiring President of the American Association for the Advancement of Science. 'New Observations on the Origin of the Galapagos Islands, with Remarks on the Geological Age of the Pacific Ocean,' G. Baur: Part II., giving the geographical distribution of different animals in the Pacific and Indo-Pacific Ocean. The number contains a portrait of the late James Ellis Humphrey, one of the associate editors of the journal.

Journal of Geology, September-October.—'The Newark System of New Jersey,' H. Kümmel: Based on the Annual Report of the State Geologist for 1896. 'The Topography of California,' Noah Fields Drake: Based on a relief map of California constructed by the author on a scale of 1 inch to 12 miles, and a vertical scale of 1 inch to 12,000 feet. 'A Comparative Study of the lower Cretaceous Formations and Faunas of the United States,' Timothy W. Stanton: A thesis submitted for Ph.D. degree in Columbian University, containing a bibliography filling 14 pages. 'Correlation of the Devonian Faunas in Southern Illinois,' Stuart Weller: Argues that the Devonian faunas in southern Illinois are not related to the Iowan Devonian faunas, but are a western extension of the faunas of the New York province.

NEW BOOKS.

The Ruins and Excavations of Ancient Rome. RODOLFO LANCIANE. Boston and New York, Houghton, Mifflin & Company. 1897. Pp. xxiv+619. $4.00.

Memorials of William Cranch Bond and of his Son George Phillips Bond. EDWARD S. HOLDEN. San Francisco, C. A. Murdock & Co.; New York, Lemcke & Buechner. 1897. Pp. iv+296.

Theory of Groups of Finite Order. W. BURNSIDE. Cambridge, The University Press. New York, The Macmillan Company. 1897. Pp. xvi+388. $3.75.

Song Birds and Water Fowls. H. E. PARKHURST. New York, Charles Scribner's Sons. 1897. Pp. viii+280. $1.50.

Erratum: In the report of the New York Section of the American Chemical Society, page 672, first column, line 33, for expensive read inexpensive.